5-6675-282-15

TM 5-6675-282-15

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT AND GENERAL SUPPORT AND DEPOT MAINTENANCE MANUAL

LEVEL, SURVEYING; MOUNTED TYPE, DUMPY STYLE (KEUFFEL & ESSER MODEL 75 0300 SPECIAL) FSN 6675-937-6863

This copy is a reprint which includes current pages from Change 2.

HEADQUARTERS, DEPARTMENT OF THE ARMY
APRIL 1968

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Change in Force: C2

TM 5-6675-282-15

* C2

Change No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, *9 November 1978*

Operator, Organizational Direct and General Support, and Depot Maintenance Manual

LEVEL, SURVEYING; MOUNTED TYPE; DUMPY STYLE
(KEUFFEL & ESSER MODEL 75 0300 SPECIAL)
NSN 6675-00-937-6863

TM 5-6675-282-15, 26 April 1968, is changed as follows:

Page i. Immediately above the table of contents add the following:

REPORTING OF ERRORS

You can help to improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, or DA Form 2028 (Recommended Changes to Publications and Blank Forms), direct to Commander, U.S. Army Troop Support and Aviation Materiel Readiness Command, ATTN: MTPS, 4300 Goodfellow Blvd., St. Louis, MO 63120. A reply will be furnished directly to you.

Page i. The Appendixes at bottom of Table of Contents page are changed as follows:

APPENDIX A	REFERENCES
APPENDIX B	COMPONENTS OF END ITEM LIST
APPENDIX C	MAINTENANCE ALLOCATION CHART
APPENDIX D	EXPENDABLE SUPPLIES AND SPECIAL TOOLS LIST

Page 1-1, paragraph 1-1b is superseded as follows:

b. Appendix A contains a list of publications applicable to this manual. Appendix B contains a list of Integral Components of the End Item and the list of Basic Issue Items authorized for the operation of the equipment. Appendix C contains the Maintenance Allocation Chart. Appendix D lists the Expendable Supplies and Materials needed to operate and maintain the surveying level.

Paragraph 1-1d is deleted in its entirety.

Paragraph 1-2 is superseded as follows:

1-2. Forms and Records.
DA Forms and Procedures used for equipment and maintenance will be only those prescribed by TM 38-750.

Page 1-2. Paragraph 1-4b(2) line 2 after "length 18 in" add "45.7 cm". After "minimum focus 11 ft" add "3.34 meters".

Page A-1. Appendix A References is superseded as follows:

*This change supersedes C1, 14 August 1972.

APPENDIX A

REFERENCES

A-1. Lubrication

C9100IL	Fuels, Lubricants, Oils and Waxes
AR703-1	Specification List of Standard Liquid Fuels, Lubricants, Preservatives and Related Products Authorized for use by U. S. Army

A-2. Painting

AR746-1	Color, Marking and Preparation of Equipment for Shipment

A-3. Maintenance

TM 38-750	The Army Maintenance Management System (TAMMS)

A-4. Shipment and Storage

TM 38-230-1	Preservation, Packing of Military Supplies and equipment (Volume 1) DSAM 4145-2, Vol. 1 NAVAIR 15-01-1 AFP 71-4, Vol. 1 P4030-31)

A-5. Demolition

TM 750-244-1-3	Procedure for Destruction of Equipment to Prevent Enemy Use

APPENDIX B. After Appendix A add Appendix B, Components of End Items List.

APPENDIX B

COMPONENTS OF END ITEM LIST

Section I. INTRODUCTION

B-1. Scope

This appendix lists Integral Components of and Basic Issue Items (BII) for the surveying level to help you inventory items required for safe and efficient operation.

B-2. General

The components of end item list are divided into the following sections:

a. Section II. Integral Components of the End Item. These items, when assembled, comprise the surveying level and must accompany it whenever it is transferred or turned in. These illustrations will help you identify these items.

b. Section III. Basic Issue Items. These are minimum essential items required to place the surveying level in operation, to operate it and to perform emergency repairs. Although shipped separately packed, they must accompany the surveying level during operation and whenever it is transferred between accountable officers. The illustrations will assist you with hard-to-identify items. This manual is your authority to requisition replacement BII based on Table(s) of Organization and Equipment (TOE)/Modification Table of Organization and Equipment (MTOE) authorization of the end item.

B-3. Explanation of Columns

a. Illustration: This column is divided as follows:

(1) Figure Number. Indicates the figure number of the illustration on which the item is shown (if applicable).

(2) Item Number. The number used to identify item called out in the illustration.

b. National Stock Number (NSN): Indicates the national stock number assigned to the end item which will be used for requisitioning.

c. Part Number (P/N): Indicates the primary number used by the manufacturer which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards and inspection requirements to identify an item or range of items.

d. Description: Indicates the federal item name and, if required, a minimum description to identify the item.

e. Location: The physical location of each item listed is given in this column. The lists are designed to inventory all items in one area of the major item before moving on to an adjacent area.

f. Usable on Code: "USABLE ON" codes are included to help you identify which component items are used on the different models. Identification of the codes used in this list are:

Not applicable

g. Quantity Required (Qty Reqd): This column lists the quantity of each item required for a complete major item.

h. Quantity: This column is left blank for use during inventory. Under the received column, list the quantity you actually receive on your major item. The date columns are for use when you inventory the major item at a later date, such as for shipment to another site.

Section II. INTEGRAL COMPONENTS OF END ITEM

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8) QUANTITY			
(a) FIGURE NO.	(b) ITEM NO.	NATIONAL STOCK NUMBER	PART NO. & FSCM	DESCRIPTION	LOCATION	USABLE ON CODE	QTY REQD	RCV'D	DATE	DATE	DATE
2-1			D46949 (33363)	Case, Carrying			1				
Not Illustrated		6760-01-048-5618	F20965 (33363)	Cap, Objective			1				
2-2		6675-00-764-7376	A21353 (33363)	Cover, Instrument			1				
2-2		6675-00-764-7371	A21181 (33363)	Sunshade			1				
		6675-00-224-8287	78-0005 (33363)	Tripod Survey consisting of:			1				
2-3			Not Applicable	Tripod Assembly			1				
2-3			A46964 (33363)	Cap, Tripod			1				

Section III. BASIC ISSUE ITEMS

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8) QUANTITY			
(a) FIGURE NO.	(b) ITEM NO.	NATIONAL STOCK NUMBER	PART NO. & FSCM	DESCRIPTION	LOCATION	USABLE ON CODE	QTY REQD	RCV'D	DATE	DATE	DATE
				TM 5-6675-282-15 Operator, Organizational, Direct and General Support and Depot Maintenance Manual		AMA	1				
2-2		7920-00-756-5681	74-0660 (33363)	Brush, Dust			1				
2-2		6675-00-764-7374	A46950 (33363)	Level Vial Assembly			1				
2-2		6675-00-813-8173	S7865-3 (33363)	Pin, Adjusting			2				
2-2		5120-00-763-7743	74-0630 (33363)	Screwdriver			1				
2-2		6675-00-764-7366	A20638 (33363)	Wrench, Spanner		AMA	1				

APPENDIX C. After Appendix B add Appendix C, Maintenance Allocation Chart. This appendix remains unchanged.

APPENDIX D. After Appendix C add Appendix D. Expendable Supplies and Materials List.

APPENDIX D

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. Scope

This appendix lists Expendable Supplies and Materials you will need to operate and maintain the surveying level. These items are authorized to you by CTA50-970, Expendable Items (except Medical, Class V, Repair Parts and Heraldic Items).

D-2. Explanation of Columns

a. Column 1 - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material.

b. Column 2 - Level. This column identifies the lowest level of maintenance that requires the listed item.

c. Column 3 - National Stock Number. This is the national stock number assigned to the item; use it to request or requisition the item.

d. Column 4 - Description. Indicates the federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parenthesis, if applicable.

e. Column 5- Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e. g., each (ea), inch (in), pair (pr), etc.) If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	0	6810-00-223-2739	Acetone, Technical 1 pt. can, Fed Spec MMM-A-185	PT
2	0	6850-00-664-5685	Cleaning Solvent Fed Spec PD-680	QT
3	0	7920-00-401-8034	Cloth, lint free, non-abrasive, General Purpose, Part No. 1001	BX
4	0	9150-00-985-7244	Grease, Instrument and Aircraft (GIA) MIL-G-23827	TU
5	0	6640-00-597-6745	Paper, Lens Tissue (4 in. x 6 in.) 50 sheets	PK
6	0	9150-00-252-6382	Lubricating Oil Watchmaking	BT
7	0	5120-01-018-5908	Orange Sticks 13218E3063 (97403)	PK

By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:
J. C. PENNINGTON
Brigadier General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-25A, Operator maintenance requirements for Surveying Equipment.

TECHNICAL MANUAL
No. 5–6675–282–15

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *26 April 1968*

OPERATOR, ORGANIZATIONAL, DIRECT AND GENERAL SUPPORT AND DEPOT MAINTENANCE MANUAL

LEVEL, SURVEYING; MOUNTED TYPE, DUMPY STYLE (KEUFFEL AND ESSER MODEL 75 0300 SPECIAL) FSN 6675–937–6863

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. These instructions are published for use by personnel to whom the Dumpy Level is issued. Chapters 1 through 3 provide information on operation, preventive maintenance services, and organizational maintenance. Chapters 4 through 6 provide information for direct and general support and depot maintenance.

b. Appendix A contains a list of publications applicable to this manual. Appendix C contains the maintenance allocation chart. Appendix B contains the list of basic issue items authorized the operator of this equipment and the list of maintenance and operating supplies required for initial operation.

c. Numbers in parentheses following nomenclature callouts on illustrations indicate quantity; numbers preceding nomenclature callouts indicate preferred maintenance sequence.

d. Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, U. S. Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Blvd., St. Louis, Mo. 63120.

1-2. Record and Report Forms

a. DA Form 2258 (Depreservation Guide for Vehicles and Equipment).

b. For other record and report forms applicable to operator or crew, and organizational maintenance, refer to TM 38-750.

Section II. DESCRIPTION AND TABULATED DATA

1-3. Description

a. Level. The Keuffel and Esser Model 75 0300 Special Dumpy Level (figs. 1-1 and 1-2) is a precision surveying instrument. The level is used to establish horizontal reference points during surveying operations. The telescope is mounted on a leveling head which mounts on the tripod. The head is provided with four leveling screws and a horizontal level vial. The level vial represents the horizontal axis of the telescope. The level is transported in the packing box (para 2-2).

b. Accessories. The accessories for the level are contained in the packing box assembly with the level (para 2-3). The accessories are: a waterproof hood, level vial in mount, dust brush, two adjusting pins, lubricant container, sun shade, screwdriver, and wrench.

1-4. Identification and Tabulated Data

a. Identification. The equipment has the following identification markings.

(1) *Dumpy level.* The manufacturer's name, model, part number and serial number, and the year are engraved on the level.

(2) *Packing box assembly.* A metal plate on the front of the packing box assembly reflects the manufacturer's name and serial number.

(3) *Tripod.* Stamped on one leg of the tripod is Level, Tripod and U.S.

b. Tabulated Data.

(1) Dumpy level.

Manufacturer	Keuffel and Esser Company
Model	75 0300 special
Type	Mounted surveying
Serial number range	200648, 203200 through 203292, 204412 through 203508, 203620 through 203766

(2) Telescope

Magnification	30 x (power)
Length	18 inches
Minimum focus	11 feet
Field of view	1.75 degrees

1-5. Difference in Models

This manual covers only the Keuffel and Esser Model 75 0300 Special Dumpy Level. No known differences exist for the model covered by this manual.

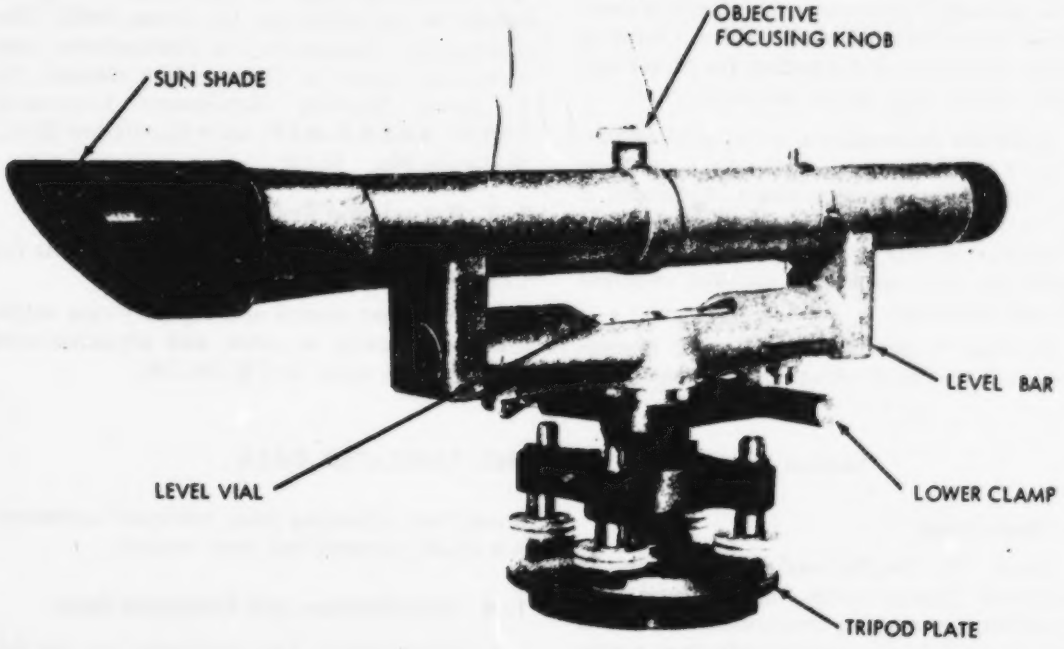
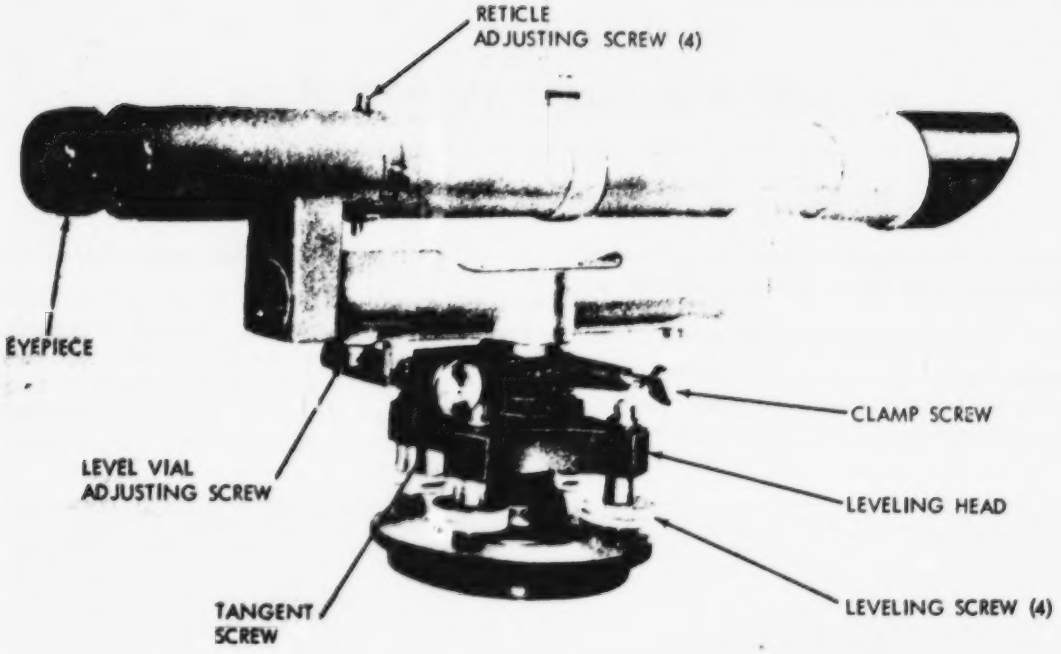


Figure 1-1. Dumpy level, left-front, three quarter view.



MEC 6675-282-15/1-2

Figure 1-2. Dumpy level, right-rear, three-quarter view.

CHAPTER 2

INSTALLATION AND OPERATION INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Unloading Equipment

The dumpy level with its accessories are shipped in the packing box assembly. The packing box assembly is enclosed in a corrugated carton which is wrapped in waterproof barrier material. These are, in turn, packed in a waterproof carton. The tripod is shipped in a waterproof carton. All the items are light enough to be handled without mechanical assistance.

2-2. Unpacking Equipment

a. Packing box assembly. Open waterproof carton, remove barrier material, open corrugated carton, and lift out packing box assembly (fig. 2-1).

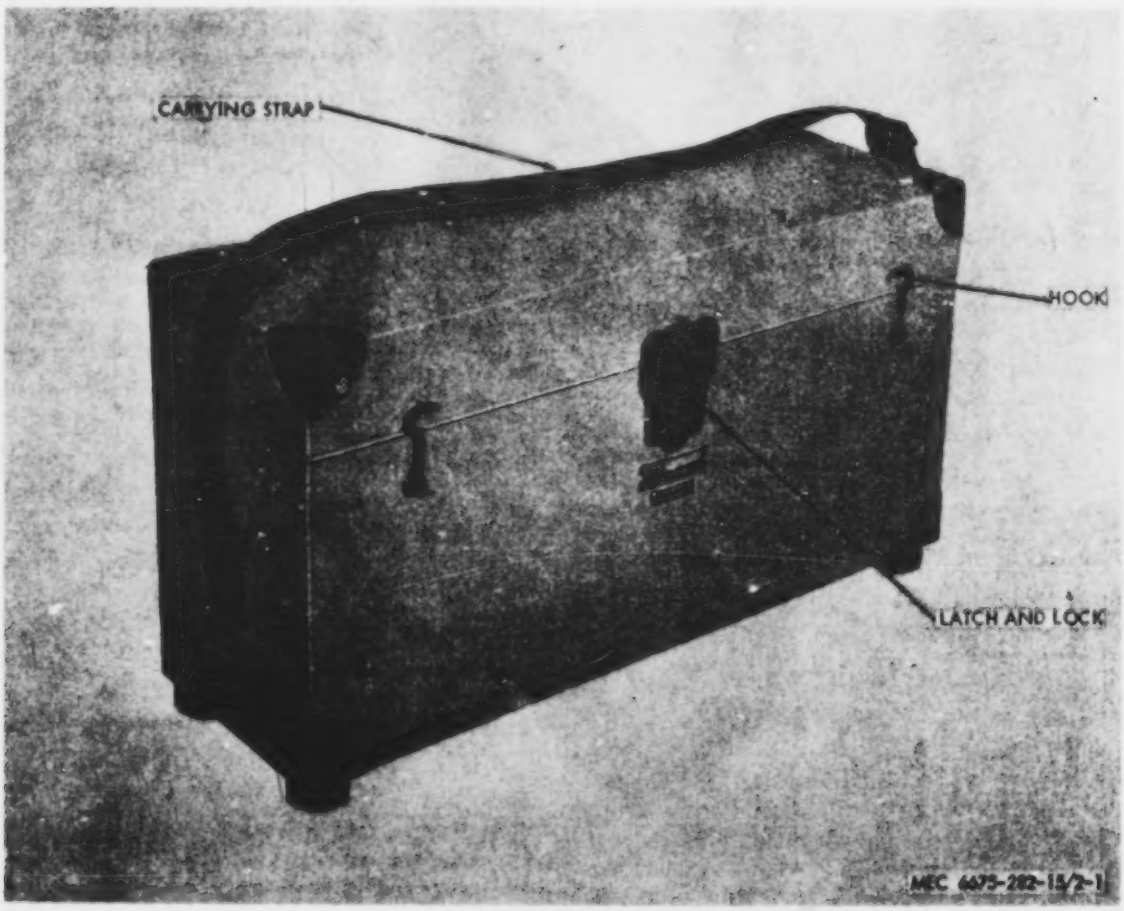


Figure 2-1. Packing box assembly, closed.

b. Tripod. Open waterproof carton, remove wrapping material, and remove tripod.

2-3. Inspecting and Servicing Equipment

a. General. Perform the daily preventive maintenance services (para 3-5).

b. Packing box assembly.

(1) Inspect box and carrying strap for breaks and cracks.

(2) Check hinges, hooks, and lock for condition and operation.

(3) Make sure that all components shown in figure 2-2 are contained in packing box.

c. Dumpy level.

(1) Visually inspect dumpy level for damaged or missing parts.

(2) Check all controls for proper operation.

d. Tripod.

(1) Inspect tripod (fig. 2-3) for damaged or missing parts.

(2) Check that shoes are tight.

2-4. Setting up Instructions

a. Tripod. Refer to figure 2-3 and set up tripod.

b. Dumpy level.

(1) Release lock and hooks (fig. 2-1) open case cover (fig. 2-2) and remove dumpy level.

(2) Refer to figure 2-3 and install dumpy level on tripod.

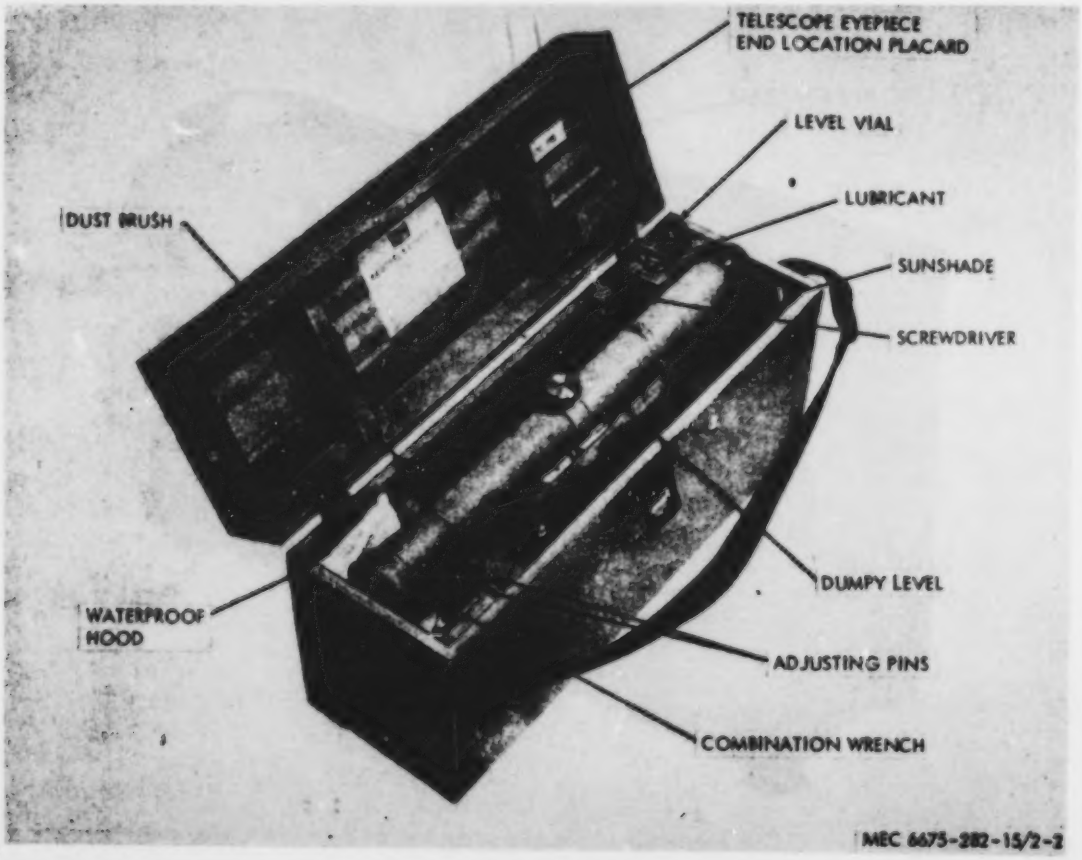


Figure 2-2. Packing box assembly, open.

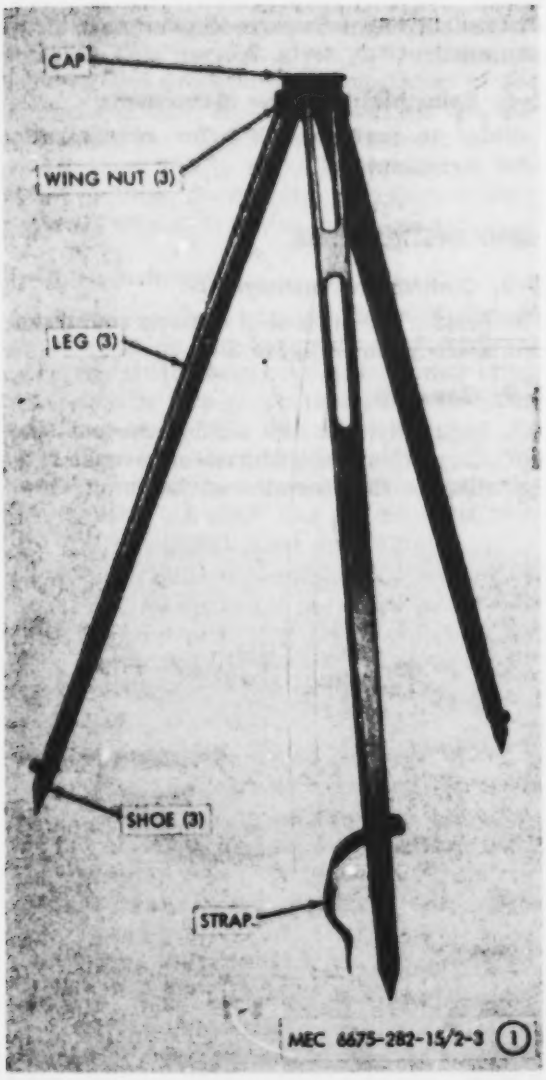


Figure 2-3 (1). Dumpy level and tripod, removal and installation.

Figure 2-3 (2)—Continued.

Section II. MOVEMENT TO A NEW WORK SITE

2-5. Dismantling for Movement

a. Short distances. For short distances in cleared level areas, the operator may carry the instrument mounted on the tripod. While the instrument is mounted on the tripod, it should only be carried in the upright position.

Caution: **Exercise care when moving the instrument mounted on tripod. Handle instrument carefully. Never subject it to bumps, jars, or shocks. Never leave the level unattended for long periods of time unless it is returned to the packing box. Never carry the instrument over the shoulder.**

b. Long distances.

(1) When dumpy level must be carried for more than a short distance or over rough terrain, it should be transported in packing box (figs. 2-1 and 2-2).

(2) Handle packing box carefully to avoid sudden jolts, continued vibration, or other shocks that might damage delicate parts of instrument.

2-6. Reinstallation After Movement

Refer to paragraph 2-4 for reinstallation after movement.

Section III. CONTROLS AND INSTRUMENTS

2-7. General

This section describes, locates, illustrates and furnishes the operator, crew, or organizational maintenance personnel sufficient information about various controls and instruments for proper operation of the dumpy level.

2-8. Control and Instruments

The location and purpose of controls and instruments are given in figure 2-4.

2-9. General

a. Instructions in this section are published for information and guidance of personnel responsible for the operation of the dumpy level.

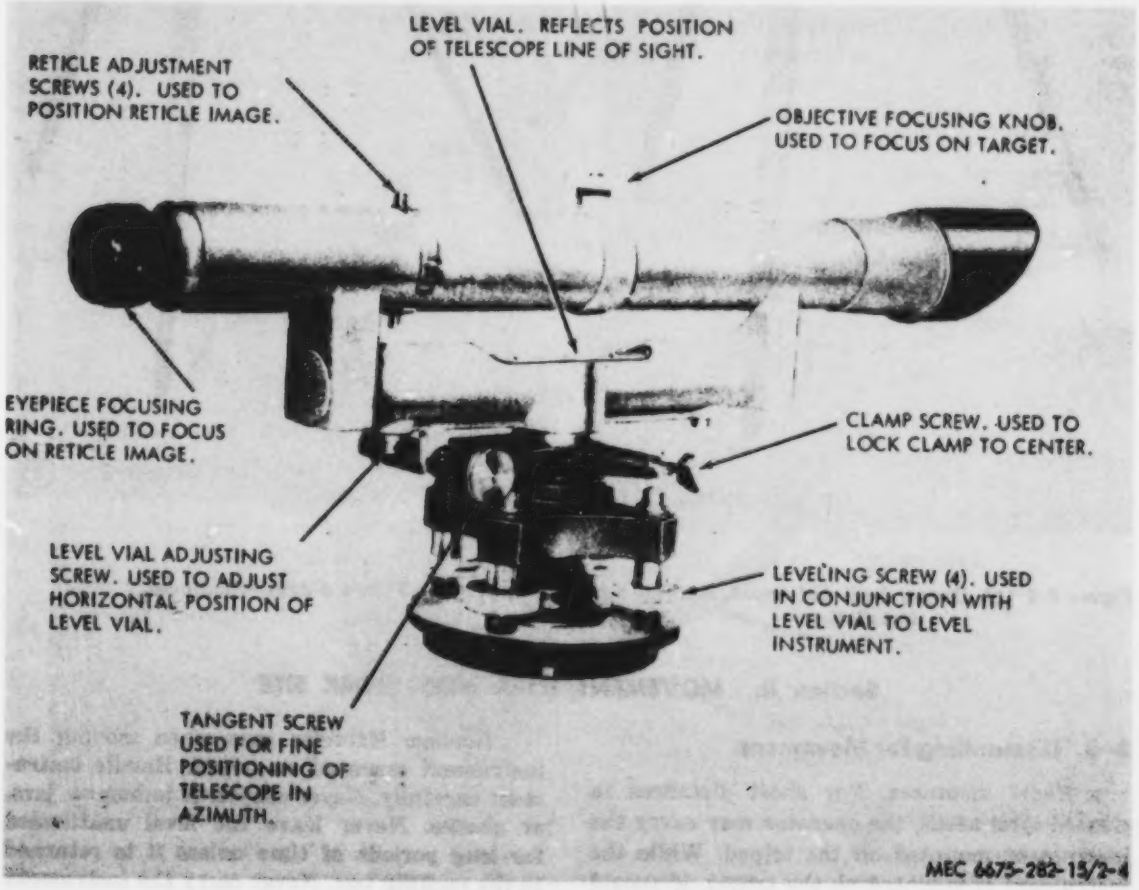

LEVEL VIAL. REFLECTS POSITION OF TELESCOPE LINE OF SIGHT.
RETICLE ADJUSTMENT SCREWS (4). USED TO POSITION RETICLE IMAGE.
OBJECTIVE FOCUSING KNOB. USED TO FOCUS ON TARGET.
EYEPIECE FOCUSING RING. USED TO FOCUS ON RETICLE IMAGE.
CLAMP SCREW. USED TO LOCK CLAMP TO CENTER.
LEVEL VIAL ADJUSTING SCREW. USED TO ADJUST HORIZONTAL POSITION OF LEVEL VIAL.
LEVELING SCREW (4). USED IN CONJUNCTION WITH LEVEL VIAL TO LEVEL INSTRUMENT.
TANGENT SCREW USED FOR FINE POSITIONING OF TELESCOPE IN AZIMUTH.
MEC 6675-282-15/2-4

Figure 2-4. Controls and instruments.

b. The operator must know how to perform every operation of which the dumpy level is capable. This section gives instructions on handling and preparation for operation of the dumpy level basic motions to perform the specific tasks for which the equipment is designed. Since nearly every job presents a different problem, the operator may have to vary given procedures to fit the individual job.

2-10 Adjustments

a. General. There are two types of adjustments made on the dumpy level; instrument and operational. Instrument adjustments bring the theodolite into proper operating condition with respect to the interrelationship of its parts. Operational adjustments bring the instrument into proper relationship with the terrain being surveyed and are required each time the instrument is set up for use.

b. Pre-adjustment procedure. Before assuming that adjustments are necessary, make sure that the instrument is at fault and that the deficiencies noted are not caused by improper testing. To properly test an instrument in the field, proceed as follows:

(1) If possible, choose a cloudy day.

(2) Set up instrument as given in figure 2-3.

(3) Perform all tests in order given. Do not adjust dumpy level unless a particular test indicates same amount of error at least three times.

Caution: **Be on the lookout for "creep", especially when adjusting the level bubble. After settling the bubble or the line of sight, let it stand for a few seconds to see that no movement occurs.**

(4) Perform adjustments in order given so that previous adjustments will not be disturbed.

(5) After each adjustment has been accomplished, perform its applicable test at once.

(6) After all required adjustments have been completed, perform all tests in order given to ensure that other adjustments have not been disturbed.

c. Level bubble.

(1) *Testing.*

(*a*) Roughly level over each of the two pairs of diametrically opposite leveling screws, and center bubble over one pair.

(*b*) Turn instrument 180 degrees in azimuth and bubble should center. If bubble fails to center proceed as given in paragraph (2) below.

(2) *Adjustment.* If bubble failed to center during the test in paragraph (1) above, proceed as given in figure 2-5.

d. Reticle cross line.

(1) Testing. Aim at some well defined point and turn telescope slightly left and right with the tangent screw. Reticle horizontal cross line should remain on the point. If cross lines did not remain on the point, proceed as given in paragraph (2) below.

(2) *Adjustment.* If reticle cross line did not remain on point in test (1) above, proceed as given in figure 2-6.

e. Line of sight.

(1) *Testing.*

(*a*) Set up dumpy level on level ground and drive two stakes in ground 180 degrees apart, approximately 100 feet from the instrument, but at exactly the same distance (fig. 2-7).

(*b*) Take a reading on each stake and carefully center level bubble for each reading. The difference between the two readings will be the true distance in elevation between the stakes.

(*c*) Prove the instrument to a known distance beyond one of the stakes and in line with the stakes (fig. 2-7). The distance should be a convenient decimal fraction of the distance between the stakes.

(*d*) Level telescope and take a reading on the near stake. Refer to figure 2-7 for an example of how to compute the error.

(2) *Adjustment.* Refer to figure 2-8.

2-11. Operation

a. Set up dumpy level on tripod (fig. 2-3).

b. Perform necessary daily preventive maintenance procedures (para. 3-5).

c. Level instrument (fig. 2-9).

d. Focus telescope as follows:

(1) Direct telescope toward a uniformly

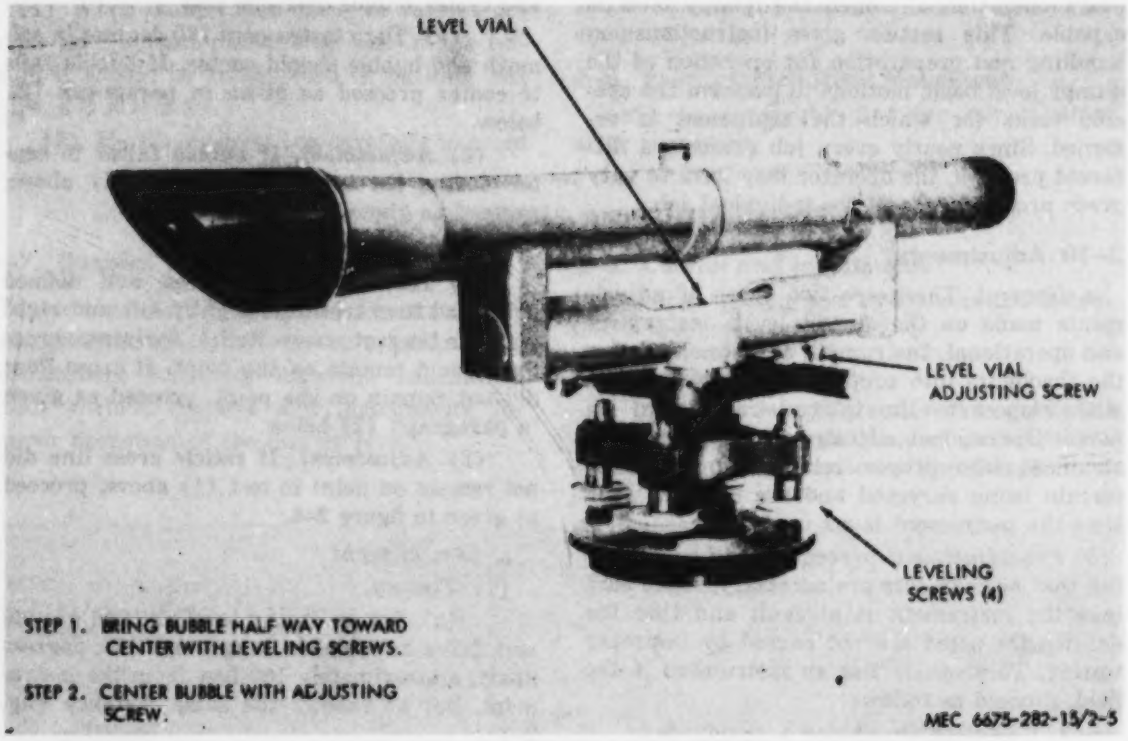

LEVEL VIAL
LEVEL VIAL ADJUSTING SCREW
LEVELING SCREWS (4)
STEP 1. BRING BUBBLE HALF WAY TOWARD CENTER WITH LEVELING SCREWS.
STEP 2. CENTER BUBBLE WITH ADJUSTING SCREW.
MEC 6675-282-15/2-5

Figure 2-5. Level bubble, adjustment.

light background adjust eyepiece focusing ring (fig. 2-4) until reticle lines are sharp.

(2) Adjust objective focusing knob (fig. 2-4) until target is clear.

2-12. Operation in Extreme Cold (Below 0° F).

The dumpy level may be used in extreme cold with no adverse effect on its capabilities. Its use is limited only by the endurance of the operating personnel and conditions affecting visibility.

Caution: **Avoid subjecting the instrument to sudden changes in temperature. Extreme temperature changes may cause internal stresses affecting accuracy and optical components may become fogged.**

2-13. Operation in Extreme Heat

If the dumpy level is operated in extreme heat and under the direct rays of the sun, interval stresses and distortion may occur which would result in poor sightings. If possible the level should be protected from the sun by a surveyor's field umbrella or other suitable means. Taking sightings during early morning or late evening will help to minimize error magnitude. Also, shorter sightings will reduce the amount of error magnitude. Also, shorter sightings will decrease the amount of sighting error. If the instrument is kept in a cool storage area, it should be removed from storage in sufficient time before use to allow the temperature of the instrument to approach that of the outside air.

2-14. Operation in Dust or Sandy Areas

Special precautions must be observed when the dumpy level is used in a dusty or sandy environment as dust and sand are highly abrasive. If foreign matter adheres to mating surfaces, the mechanisms may bind. The instrument should be kept as clean as possible. Use extreme care

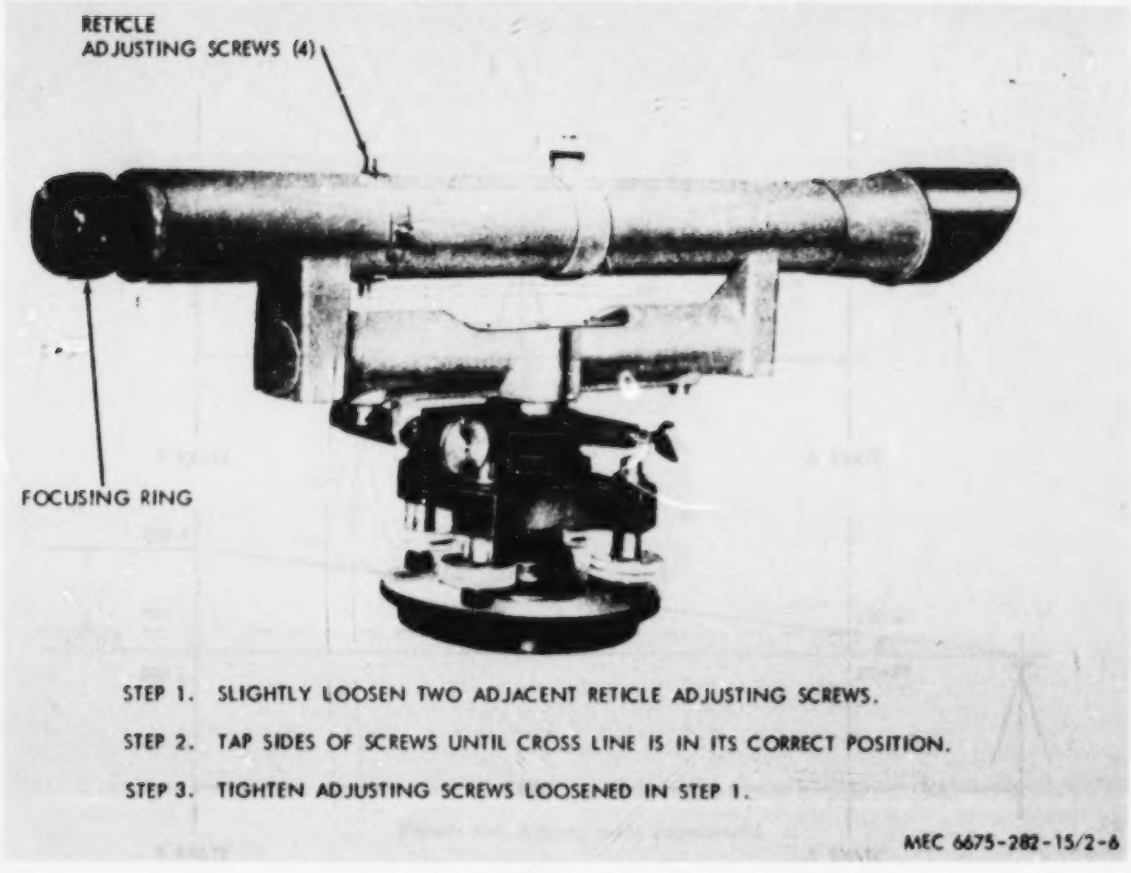

RETICLE
ADJUSTING SCREWS (4)
FOCUSING RING
STEP 1. SLIGHTLY LOOSEN TWO ADJACENT RETICLE ADJUSTING SCREWS.
STEP 2. TAP SIDES OF SCREWS UNTIL CROSS LINE IS IN ITS CORRECT POSITION.
STEP 3. TIGHTEN ADJUSTING SCREWS LOOSENED IN STEP 1.
MEC 6675-282-15/2-6

Figure 2-6. Reticle cross line, adjustment.

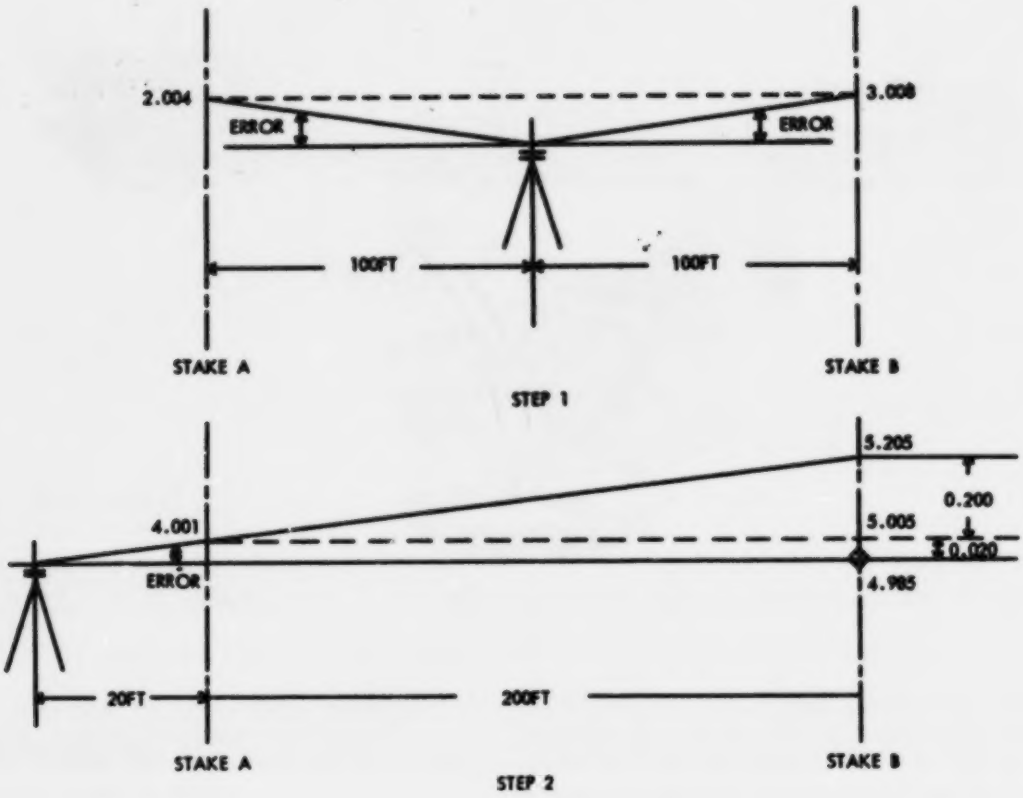
to avoid scratching the optical surfaces while cleaning. Protect the level from blowing dust and sand. Always place a protective cover over the instrument when it is not in use.

2-15. Operation under Rainy or Humid Conditions

In spite of its enclosed construction, the dumpy level is not waterproof. In humid areas, a drop in temperature may cause condensate to fog the lenses. Internal fogging can usually be removed by placing the theodolite in a warm dry environment. External condensation may be removed using a chamois. During rainfall, protect the instrument with a surveyor's field umbrella; and between periods of use, while it is set up on the tripod, cover it with a waterproof hood. If the instrument is wet, do not keep it in the packing box any longer than necessary. As soon as possible, remove the instrument and do not return it to the box until it is completely dry.

2-16. Operation in Salt Water Areas

Salt is highly corrosive to metal. If using the dumpy level in salt water areas, wipe it frequently with a chamois. If salt water contacts the instrument, the exterior should be thoroughly cleaned. As soon as possible, return the instrument to direct and general support maintenance.



IF THE READING OF THE NEAR STAKE IS 4.001, THE READING OF THE FAR STAKE SHOULD BE 4.001 PLUS THE DIFFERENCE BETWEEN THE VALUES OBTAINED IN STEP 1 (3.008-2.004=1.004, 4.001+1.004=5.005). ASSUMING THAT THE HORIZONTAL CROSS LINE STRIKES AT 5.205 AS SHOWN IN STEP 2, THE LINE OF SIGHT MUST SLOPE UPWARD AT A RATE OF 0.200 FEET IN 200 FEET. IN THE 20 FEET BETWEEN THE DUMPY LEVEL AND STAKE A, THE ERROR INTRODUCED BY THIS SLOPE IS, BY SIMILAR TRIANGLES, 1/10 OR 0.200 - 0.020=4.985. A TARGET SET AT 4.985 WILL BE LEVEL WITH THE INSTRUMENT.

NOTE: IF THE LINE OF SIGHT, INSTEAD OF STRIKING ABOVE THE COMPUTED READING, STRIKES BELOW IT, THE TWO ERRORS MUST BE ADDED TO THE STAKE READING INSTEAD OF BEING SUBTRACTED FROM IT.

MEC 6675-282-15/2-7

Figure 2-7. Peg test.

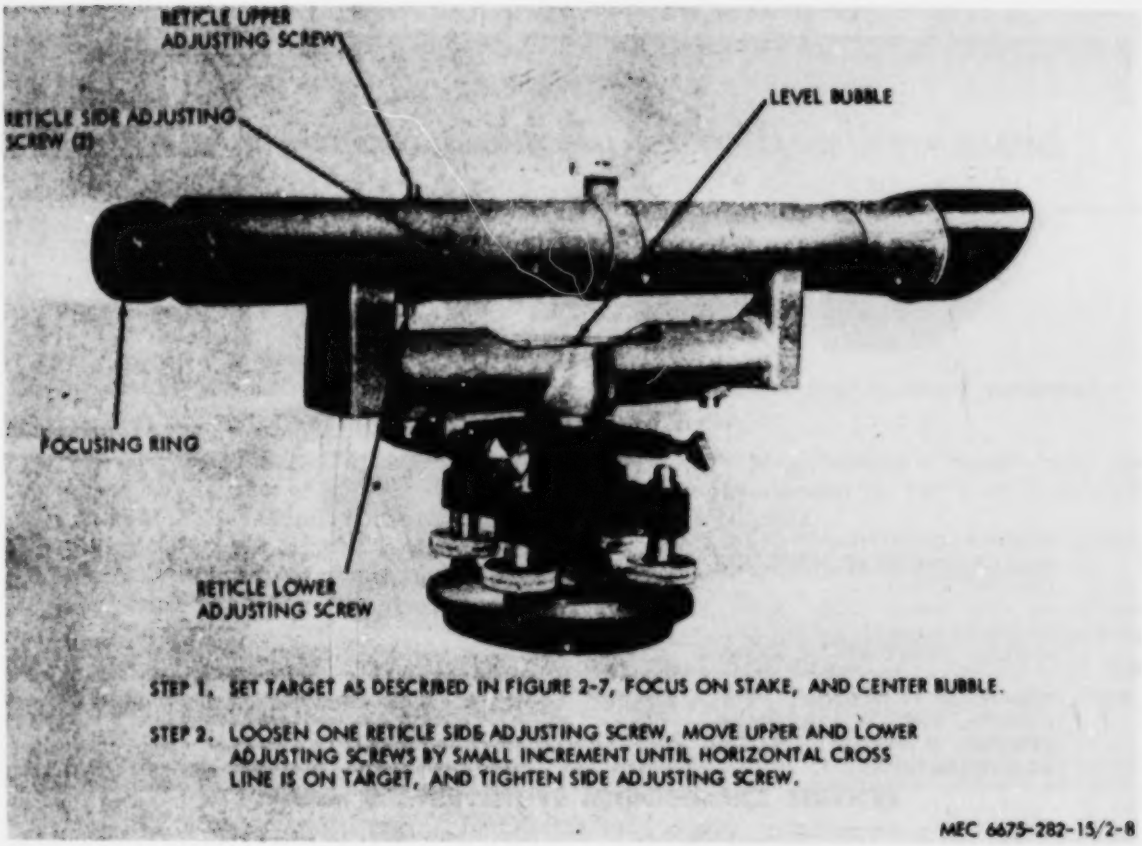

RETICLE UPPER ADJUSTING SCREW
RETICLE SIDE ADJUSTING SCREW (2)
LEVEL BUBBLE
FOCUSING RING
RETICLE LOWER ADJUSTING SCREW
STEP 1. SET TARGET AS DESCRIBED IN FIGURE 2-7, FOCUS ON STAKE, AND CENTER BUBBLE.
STEP 2. LOOSEN ONE RETICLE SIDE ADJUSTING SCREW, MOVE UPPER AND LOWER ADJUSTING SCREWS BY SMALL INCREMENT UNTIL HORIZONTAL CROSS LINE IS ON TARGET, AND TIGHTEN SIDE ADJUSTING SCREW.
MEC 6675-282-15/2-8

Figure 2-8. Line-of-sight adjustment.

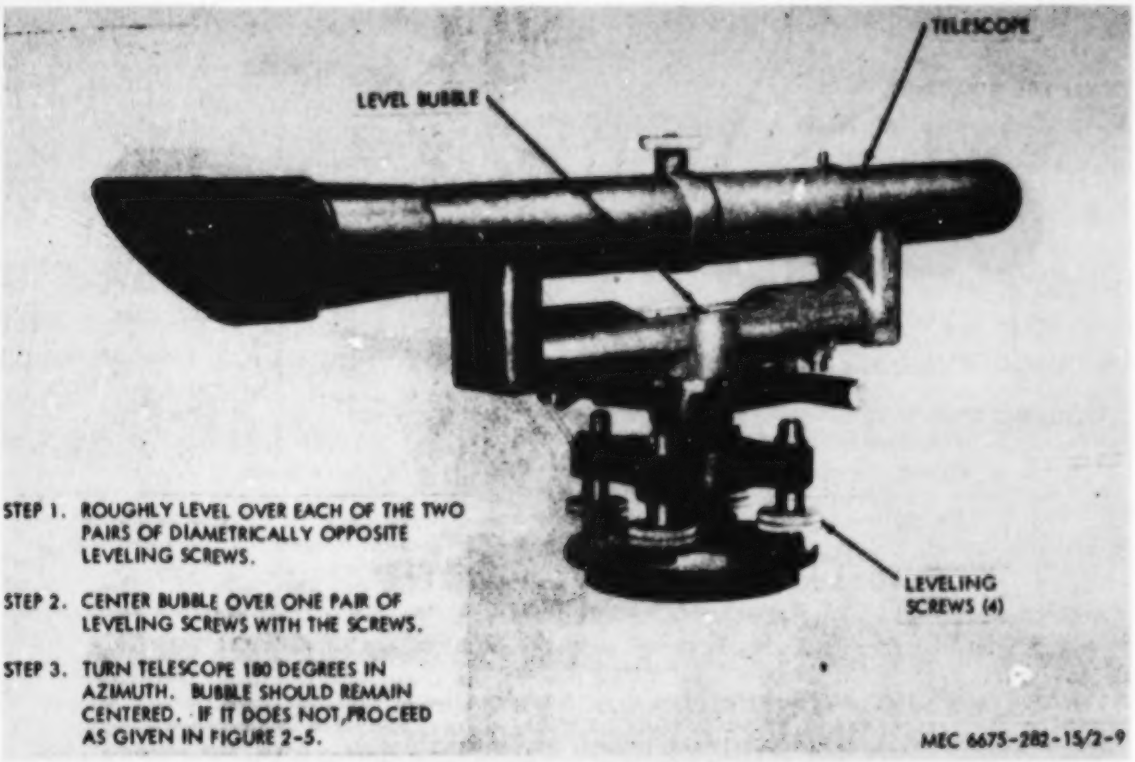

TELESCOPE
LEVEL BUBBLE
LEVELING SCREWS (4)
STEP 1. ROUGHLY LEVEL OVER EACH OF THE TWO PAIRS OF DIAMETRICALLY OPPOSITE LEVELING SCREWS.
STEP 2. CENTER BUBBLE OVER ONE PAIR OF LEVELING SCREWS WITH THE SCREWS.
STEP 3. TURN TELESCOPE 180 DEGREES IN AZIMUTH. BUBBLE SHOULD REMAIN CENTERED. IF IT DOES NOT, PROCEED AS GIVEN IN FIGURE 2-5.
MEC 6675-282-15/2-9

Figure 2-9. Dumpy level, leveling.

CHAPTER 3

OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. OPERATOR AND ORGANIZATIONAL MAINTENANCE TOOLS AND EQUIPMENT

3-1. Special Tools and Equipment

No special tools or equipment are required by operator or organizational maintenance personnel for maintenance of the dumpy level. The part number is the Federal supply code number for the manufacturer of the tool. No special equipment is required by organizational maintenance personnel for performing maintenance on the instrument.

3-2. Organizational Maintenance Repair Parts

Organizational maintenance repair parts are listed and illustrated in TM 5-6675-282-20P (when published).

3-3. Basic Issue Tools and Equipment

Tools and repair parts issued with or authorized for use within the dumpy level are listed in the Basic Issue Items List, appendix B of this manual.

Section II. PREVENTIVE MAINTENANCE SERVICES

3-4. General

To ensure that the dumpy level is ready for operation at all times, it must be inspected systematically so that the defects can be discovered and corrected before they result in serious damage or failure. The neccasary preventive maintenance services to be performd are listed and described in paragraphs 3-5 and 3-6. Item numbers indicate the sequence of minimum inspection requirements. Defects discovered during operation shall be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noticed which would damage the equipment if operation were continued. All deficiencies and short comings will be recorded together with the corrective action taken on Form 2404 (Equipment Inspection and Maintenance Worksheet) at the earliest possible opportunity.

3-5. Daily Preventive Maintenance Services

Figure 3-1 contains an illustrated tabulated listing of preventive maintenance services which must be performed by the operator. The item numbers are listed consecutively and indicate the sequence of minimum requirements.

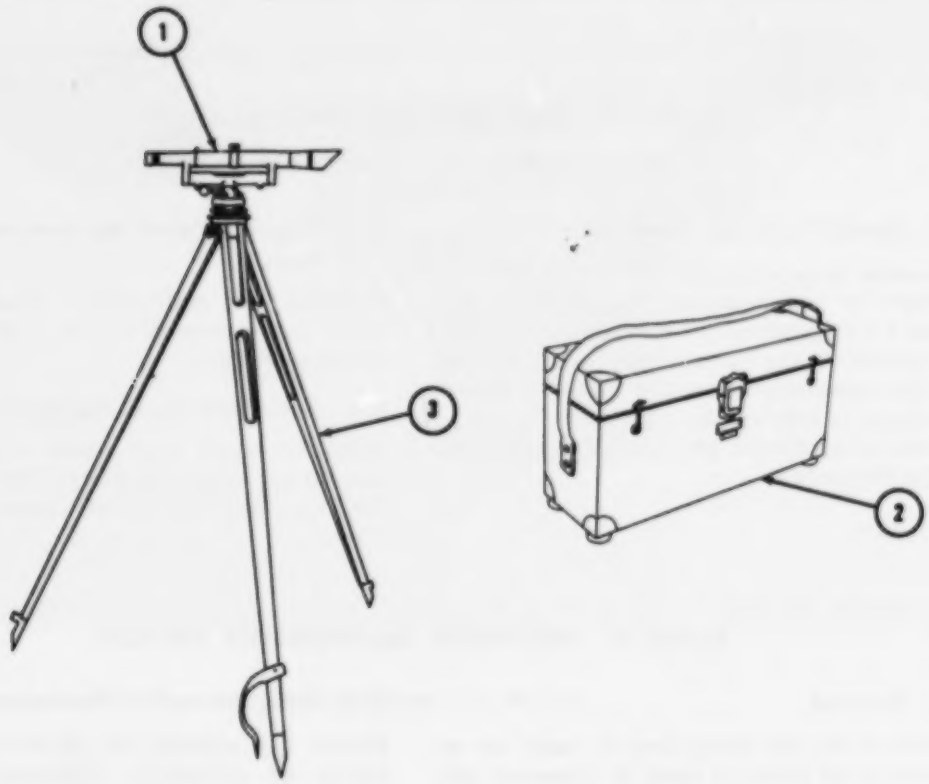
3-6. Quarterly Preventive Maintenance Services

Figure 3-2 contains an illustrated tabulated listing of preventive maintenance services which must be performed by organizational maintenance personnel at quarterly intervals. A quarterly interval is equal to 3 calendar months or 250 hours of operation whichever comes first.

PREVENTIVE MAINTENANCE SERVICES

DAILY

TM 5-6675-282-15 KEUFFEL & ESSER MODEL 75 0300 SPECIAL DUMPY LEVEL



ITEM			PAR. REF.
1	DUMPY LEVEL	Clean dirty lenses. Check eyepiece and all controls for freedom of movement.	3-15
2	PACKING BOX	Check for missing components. Clean dirty box.	3-17
3	TRIPOD	Check for missing components. Clean dirty tripod	3-16

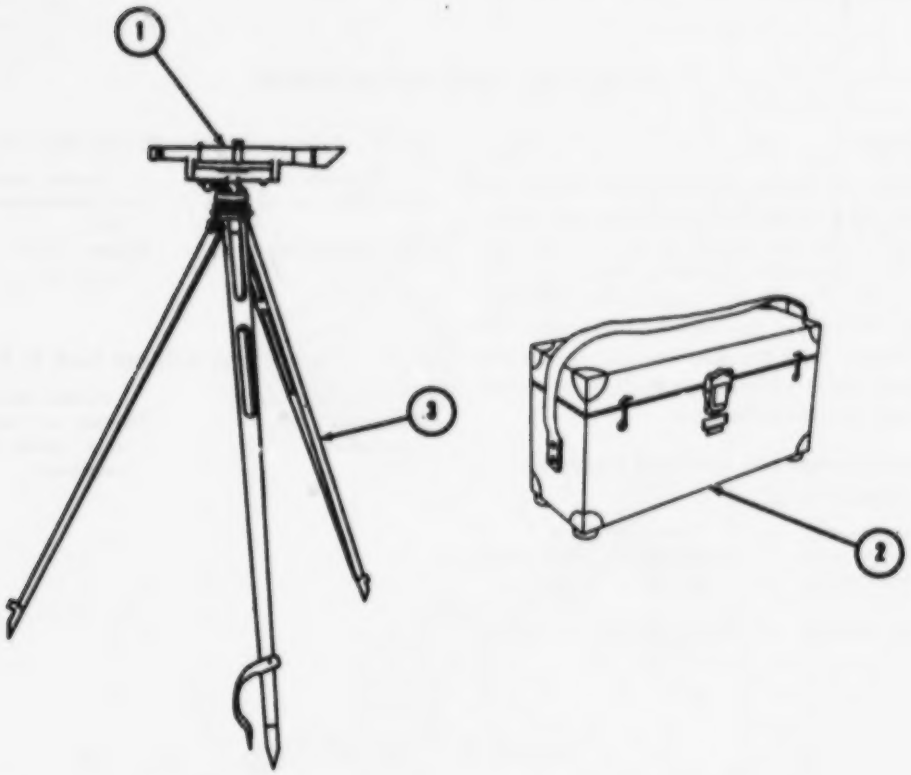
MEC 6675-282-15/3-1

Figure 3-1. Daily preventive maintenance services.

PREVENTIVE MAINTENANCE SERVICES

QUARTERLY

TM 5-6675-282-15 KEUFFEL & ESSER MODEL 75 0300 SPECIAL DUMPY LEVEL



ITEM			PAR. REF.
1	DUMPY LEVEL	Check dirty lenes. Check eyepiece and all controls for freedom of movement. Replace defective dumpy level.	3-15
2	PACKING BOX	Replace missing or defective components.	3-17
3	TRIPOD	Repair or replace defective components.	3-16

MEC 6675-282-15/3-2

Figure 3-2. Quarterly preventive maintenance services.

Section III. OPERATOR'S MAINTENANCE SERVICES

3-7. General

Instructions in this section are published for the information and guidance of the operator to maintain the dumpy level. Operator's maintenance is confined to external cleaning and adjusting of the instrument, repair of the tripod, lubricating screw threads and replacement of accessories.

Section IV. TROUBLESHOOTING

3-8. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the dumpy level and its components. Each trouble symptom stated is followed by a list of probable causes. The possible remedy recommended is described opposite the probable cause. Any trouble beyond the scope of organizational maintenance shall be reported to direct support maintenance.

3-9. Dumpy Level will not Seat Properly on Tripod Head

Probable Cause	*Possible Remedy*
Tripod head and plate threads improperly started.	Restart tripod plate (para 2-4*b*(2)).
Tripod head defective	Replace tripod head (para 3-12*c*).

3-10. Dumpy Level will not Stay on Line

Probable Cause	*Possible Remedy*
Instrument out of level	Level instrument (para 2-11*c*).
Level bubble out of adjustment.	Adjust bubble (para 2-2-10*e*(2)).

3-11. Tripod Legs will not Lock in Position

Probable Cause	*Possible Remedy*
Wing nuts loose or defective.	Tighten or replace wing nuts (para 3-12*a*), as necessary.

Section V. TRIPOD

3-12. General

When the dumpy level is being used for surveying it is mounted on the tripod head. The tripod is provided with a strap which is used to lash the legs together while it is being transported. The legs are individually positionable and are secured by wing nuts. When the tripod is not in use a cap is screwed on the head to protect it.

a. Disassembly. Disassemble the tripod in the numerical sequence given in figure 3-1.

b. Cleaning, inspection, and repair.

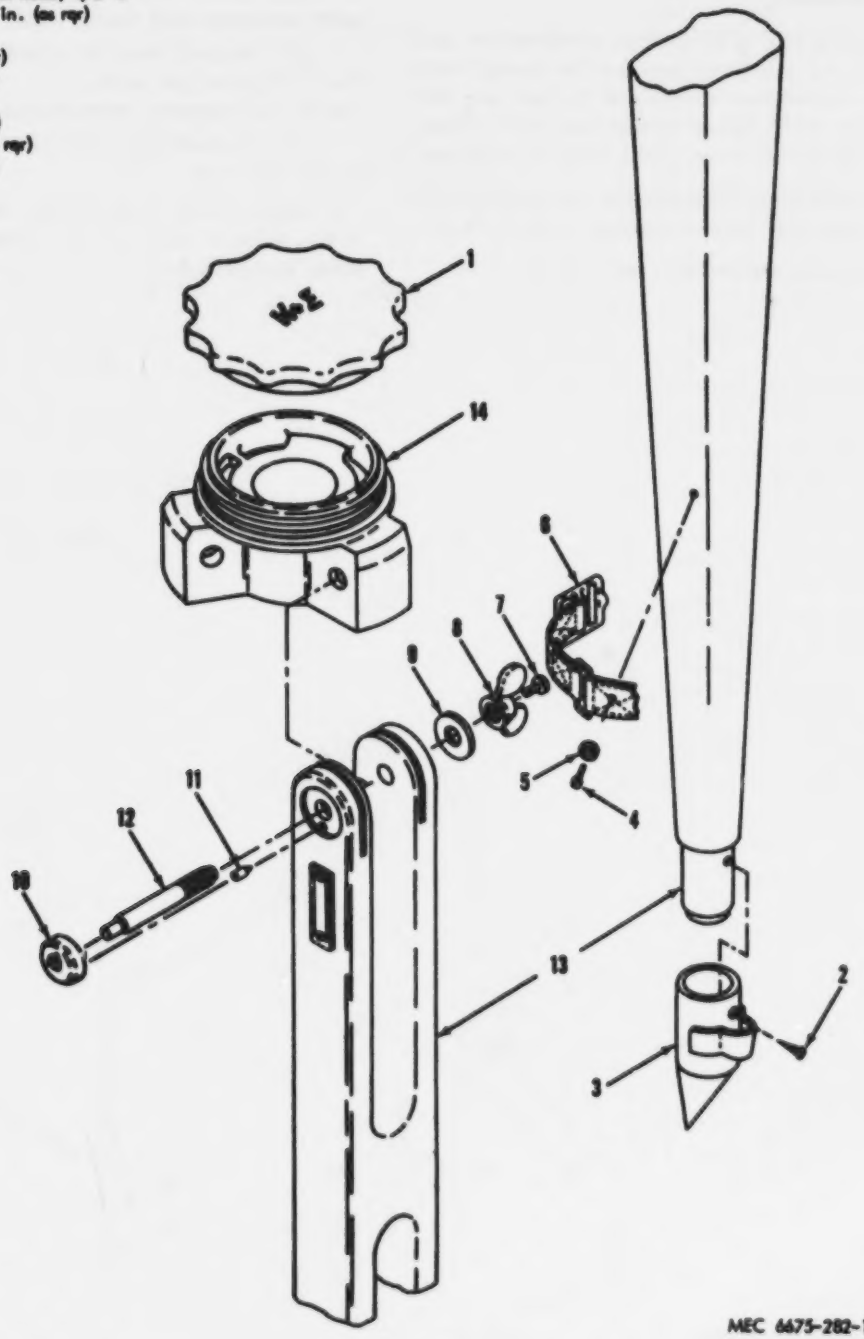
(1) Inspect strap for cuts, wear, and damaged seams. Inspect wooden legs for cracks, splits, wear, and warping.

(2) Remove all burrs and minor scratches. Paint wooden legs if protective coating is worn or damaged. Paint any surface that shows bare metal.

(3) Replace any defective part that cannot be repaired.

c. Reassembly. Reassemble the tripod in the reverse order of the numerical sequence given in figure 3-3.

1. Cap
2. Wood screw, flat head, 1/2-5 (9 rqr)
3. Shoe (3 rqr)
4. Wood screw, oval head, 1/2-6
5. Washer, flat, 1 in. (as rqr)
6. Strap
7. Bolt screw (3 rqr)
8. Wing nut (3 rqr)
9. Washer, flat
10. Bolt head (3 rqr)
11. Bolt head pin (3 rqr)
12. Bolt stem (3 rqr)
13. Leg (3 rqr)
14. Head



MEC 6675-282-15/3-3

Figure 3-3. Tripod, exploded view.

Section VI. PACKING BOX

3-13. General

The packing box is of wooden construction and serves as the carrying case for the dumpy level and its accessories. Contained in the case are the dumpy level, spare bubble vial, dust brush, tools, waterproof cover, and a tube of lubricant.

a. Disassembly. Disassemble the packing box in the numerical sequence given in figure 3-4.

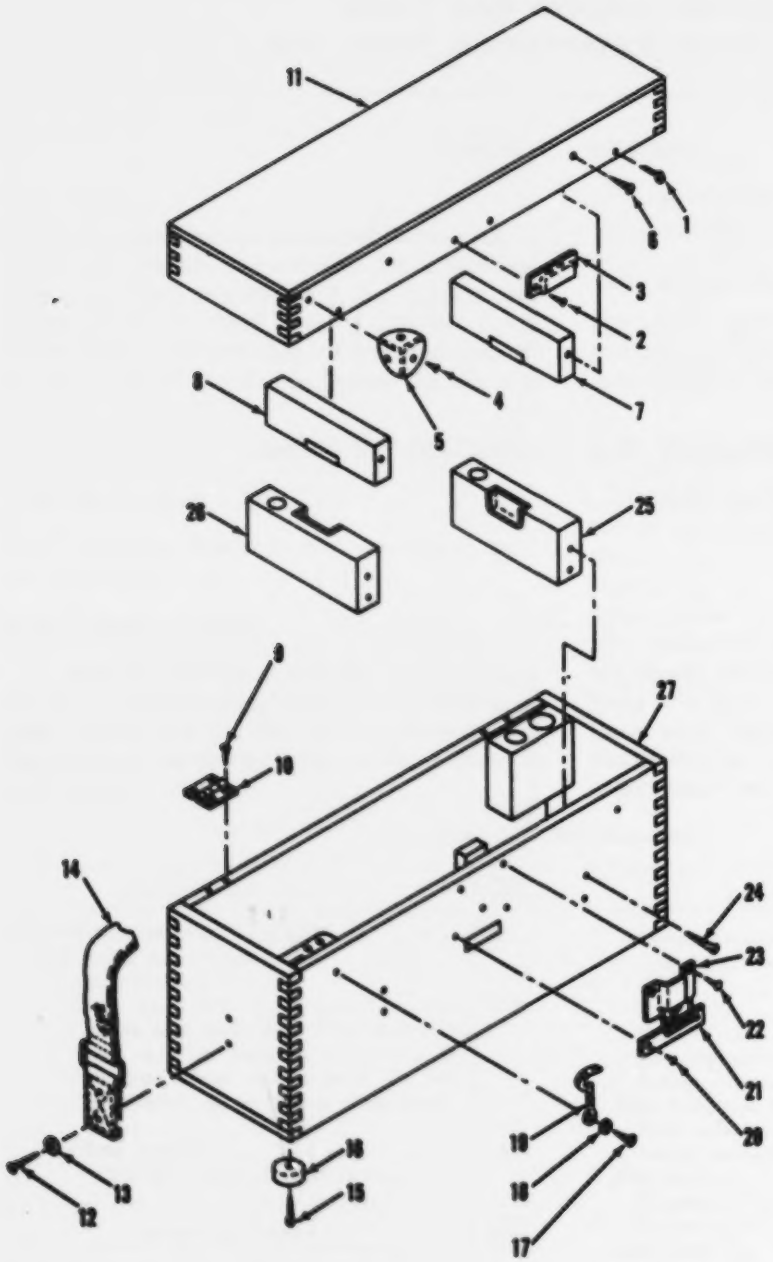
b. Cleaning, inspection, and repair.

(1) Clean exterior of packing box with a mild detergent and warm water.

(2) Inspect case for cracks. Check condition of hinges and latch.
Checks for missing components.

(3) Replace any defective part that cannot be repaired.

c. Reassembly. Reassemble the packing box in the reverse order of the numerical sequence given in figure 3-4.



1. Eyescrew (2 rqr)
2. Wood screw, fillister head, No. 10-32 Nr x 5/8 (2 rqr)
3. Upper lock half
4. Wood screw, oval head, No. 2-38 (12 rqr)
5. Corner (4 rqr)
6. Wood screw, oval head, 1-1/2-8 (4 rqr)
7. Block
8. Block
9. Wood screw, flat head, 3/8-4 (16 rqr)
10. Hinge (2 rqr)
11. Cover
12. Wood screw, oval head, 1/4 in. dia. (4 rqr)
13. Strap, washer, 0.254 in. ID (4 rqr)
14. Strap
15. Wood screw, round head, 3/4-8 (4 rqr)
16. Bumper (4 rqr)
17. Wood screw, round head, No. 8-1/2 (2 rqr)
18. Washer, flat, 0.254in. ID (2 rqr)
19. Hook (2 rqr)
20. Wood screw, round head (2 rqr)
21. Name plate
22. Wood screw, fillister head, No. 10-32 NF x 5/8 (3 rqr)
23. Lower lock half
24. Wood screw, oval head, 1-1/2-8 (4 rqr)
25. Right support
26. Left Support
27. Box

MEC 6675-282-15/3-4

Figure 3-4. Packing box, exploded view.

CHAPTER 4

DIRECT AND GENERAL SUPPORT AND DEPOT MAINTENANCE INSTRUCTIONS

Section I. GENERAL

4-1. Scope

These instructions are published for the use of direct and general support and depot maintenance personnel maintaining the Keuffel and Esser Model 75 0300 Special Dumpy Level. They provide information on the maintenance of the equipment, which is beyond the scope of tools, equipment, personnel, or supplies normally available to using organizations.

4-2. Record and Report Forms

For record and report forms applicable to direct and general support and depot maintenance, refer to TM 38-750.

Section II. DESCRIPTION AND TABULATED DATA

4-3. Description

For a complete description of the dumpy level, see paragraph 1-3.

4-4. Tabulated Data

a. General. Tabulated data are listed in paragraph 1-4. Engineering data such as tolerances, wear limits, and the like are not available, as the parts of the dumpy level are hand fitted to each other.

b. Time Standards. Table 4-1 lists the number of man-hours required under normal conditions to perform the indicated maintenance and repair for the dumpy level. Components are listed under the appropriate functional index. The times listed are not intended to be rigid standards. Under adverse conditions, the operations will take longer; but under ideal conditions with higher skilled mechanics, most of the operations can be accomplished in considerably less time.

Table 4-1. Time Standards

Lubrication and Service	Man-hours
67 PRECISION INSTRUMENT	
6700 Major Assemblage	
Level, surveying:	
Clean (general)	0.3
(Use soft cloth, free from dirt and oil, only on exterior parts, not to include lenses and mirrors. Do not use water, oil or liquids when cleaning.)	
Clean (special	2.0
(Use lens tissue to clean lenses.)	

Remove and Replace	Man-hours
18 BODY, CAB, HOOD, HULL	
1808 Packing Box Assembly	0.1
67 PRECISION INSTRUMENT	
6700 Major Assemblage	
Level, surveying	5.5
Lower part assembly	2.0
Center	0.8
Clamp	0.3
Head	0.3
Leveling screw	0.3
Tangent screw	0.3
6701 Telescope Assembly	
Draw tube and pinion assembly	0.2
Barrel assembly	0.8
6702 Optics	
Eyepiece assembly	0.3
Objective lens	0.1
6718 Level Vial Assembly	0.5
6719 Tripod	
Head	0.5
Leg assembly	0.3
Leg clamp assembly	0.2

CHAPTER 5

GENERAL MAINTENANCE INSTRUCTIONS

Section I. SPECIAL TOOLS AND EQUIPMENT

5-1. Special Tools and Equipment

The special tools required for direct and general support and depot maintenance personnel for performing maintenance on the dumpy level are listed in table 5-1.

Table 5-1. Special Tools

Item	Federal stock No.	Fig. ref	Use
Wrench, combination	5120-353-3521	2-2	To remove and install center.

5-2. Direct Support, General Support and Depot Maintenance Repair Parts

Direct and general support and depot maintenance repair parts are listed and illustrated in TM 5-6675-282-35P (when published).

5-3. Specially Designed (Fabricated) Tools and Equipment

No specially designed tools or equipment are required by direct and general support and depot maintenance personnel.

Section II. LUBRICATION

5-4. General

a. General. All moving parts of the dumpy level are fitted with extremely fine tolerances and must be thoroughly cleaned prior to lubrication. If the parts are not cleaned, the instrument may be damaged. Use only the lubricant that is approved for the instrument. Keep the cap on the lubricant tube. Never allow dust, dirt, or other foreign matter to contact the lubricant. No lubrication is to be performed in the field.

b. Cleaning. Keep all external parts not requiring lubrication, free of the lubricant. Before lubricating the instrument, wipe all lubrication points free of dirt or other foreign matter using a clean lint-free cloth.

c. Lubrication. Lubrication of the dumpy level should be performed just before reassembly. Do not use more than one drop of lubricant at each point. The lubricant should be thoroughly spread and worked in, and any excess carefully wiped off. The points to be lubricated are as follows (fig. 6-9):

(1) Bearing surface and shoulder of center (7).

(2) Spring (16) and plunger (17).

(3) Threads of clamp screw (9), tangent screw (12), and leveling screw stems (19).

(4) Collar and surfaces of clamp (18).

(5) Surface of half ball (5).

(6) Upper surface and threads of tripod plate (6).

Section III. TROUBLESHOOTING

5-5. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the dumpy level or any of its components. Each trouble symptom stated is followed by a list of probable causes. The possible remedy recommended is described opposite the probable cause.

5-6. Dumpy Level will not Seat Properly on Tripod Head

Probable Cause	*Possible Remedy*
Lower part assembly defective.	Repair or replace lower part assembly (para 6-6).

5-7. Dumpy Level will not Stay on Line

Probable Cause	*Possible Remedy*
Lower part assembly loose or defective.	Repair or replace lower part assembly (para 6-6).

5-8. Leveling Screws too Tight or too Loose

Probable Cause	*Possible Remedy*
Leveling screws dirty or worn.	Clean, repair, or replace leveling screws (para 6-6).

5-9. Objective Focusing Knob Hard to Move

Probable Cause	*Possible Remedy*
Defective pinion assembly.	Repair or replace pinion assembly (para 6-3).
Defective draw tube.	Repair or replace draw tube (para 6-3).

5-10. Eyepiece Hard to Move

Probable Cause	*Possible Remedy*
Dirty or defective focusing ring.	Clean, repair, or replace focusing ring (para 6-2).

CHAPTER 6

REPAIR INSTRUCTIONS

Section I. GENERAL

6-1. Scope

This section contains direct and general support and depot maintenance instructions for all the components that comprise the dumpy level. Repair instructions for the tripod are given in paragraph 3-12.

Section II. DUMPY LEVEL COMPONENTS

6-2. Eyepiece Assembly

a. General. The eyepiece is mounted in the telescope barrel. The eyepiece assembly is used to focus on the reticle image.

b. Removal. Refer to figure 6-1 and remove the eyepiece assembly.

c. Disassembly. Disassemble the eyepiece assembly in the numerical sequence in figure 6-2.

d. Inspection and repair.

(1) Inspect lenses for scratches, clips, cracks and etching.

(2) Check all other parts for distortion, cracks, breaks, and burrs.
Check condition of all threads.

(3) Remove all burrs. Replace any defective part that cannot be repaired.

e. Reassembly. Reassemble the eyepiece assembly in the reverse order of the numerical sequence given in figure 6-2.

f. Installation. Refer to figure 6-1 and install the eyepiece assembly.

6-3. Draw Tube and Pinion Assembly

a. General. The draw tube contains the objective focusing lens of the telescope. Focus control is effected by the pinion assembly.

b. Removal. Refer to figure 6-3 and remove the draw tube and pinion assembly.

c. Disassembly. Disassemble the draw tube and pinion assembly in the numerical sequence given in figure 6-4.

d. Cleaning.

(1) Clean lenses with a lens tissue.

(2) Clean all non-optical parts with an approved cleaning solvent and dry thoroughly.

e. Inspection and repair.

(1) Inspect lenses for scratches, chips, cracks, and etching.

(2) Check all other parts for distortion, cracks, breaks, and burrs.
Check condition of all threads.

(3) Remove all burrs. Replace any defective part that cannot be repaired.

f. Reassembly. Reassemble the draw tube and pinion assembly in the reverse order of the numerical sequence given in figure 6-4.

g. Installation. Refer to figure 6-3 and install the draw tube and pinion assembly.

6-4. Barrel Assembly

a. General. The barrel assembly serves to house the elements of the telescope and the level vial. The barrel assembly mounts on the center of the lower part assembly.

b. Removal. Refer to figure 6-5 and remove the barrel assembly.

Figure 6–1. Eyepiece assembly, removal and installation.

c. Disassembly. Disassemble the barrel assembly in the numerical sequence given in figure 6–6.

d. Cleaning.

(1) Clean lenses with a lens tissue.

(2) Clean all non-optical parts with an approved cleaning solvent and dry thoroughly.

e. Inspection and repair.

(1) Inspect lenses for scratches, cracks, chips, and etching.

(2) Check all other parts for distortion, cracks, breaks, and burrs.

(3) Remove all burrs. Replace any defective part that cannot be repaired.

f. Reassembly. Reassemble the barrel assembly in the reverse order of the numerical sequence given in figure 6–6.

g. Installation. Refer to figure 6–5 and install the barrel assembly.

6–5. Level Vial Assembly

a. General. The level vial assembly is used to determine that the line of sight is horizontal. A spare vial is supplied in the packing box.

b. Removal. Refer to figure 6–7 and remove the level vial assembly.

c. Disassembly. Disassemble the level vial assembly in the numerical sequence given in figure 6–8.

d. Cleaning. Clean all parts with an approved cleaning solvent and dry thoroughly.

e. Inspection and repair.

(1) Check level vial assembly for cracks, chips, scratches, or etching.

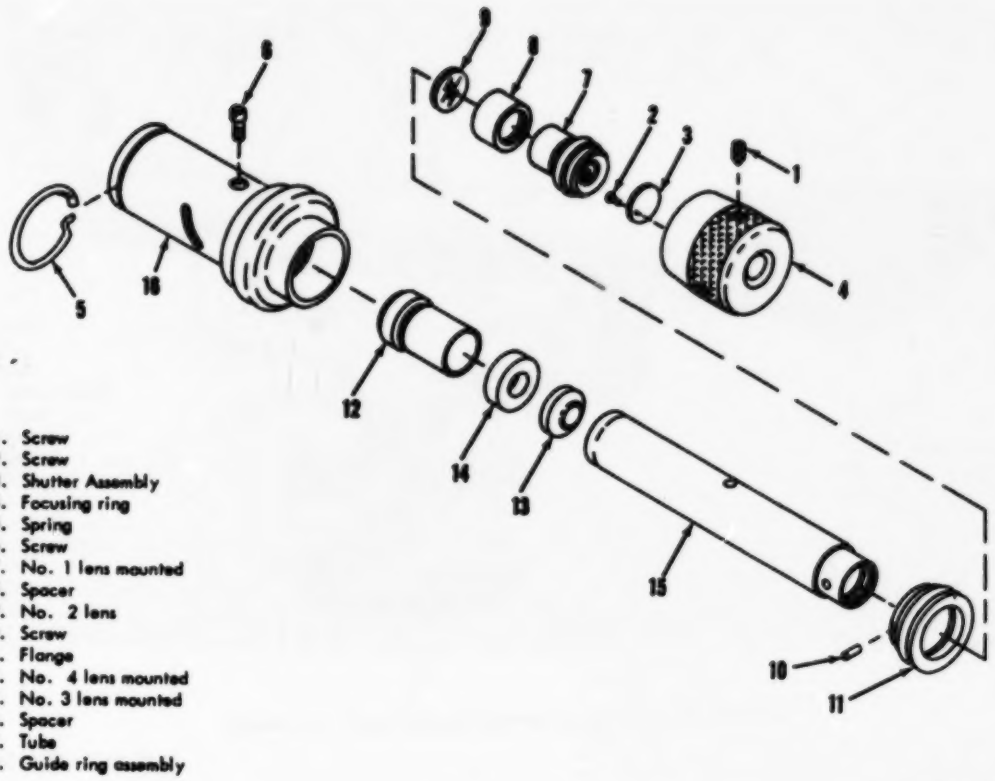


Figure 6-2. Eyepiece assembly, exploded view.

(2) Check all other parts for breaks, cracks, distortion or burrs.

(3) Remove all burrs. Replace any defective part that cannot be repaired.

f. Reassembly. Reassemble the level vial assembly in the reverse order of the numerical sequence given in figure 6-8.

g. Installation. Refer to figure 6-7 and install the level vial assembly.

6-6. Lower Part Assembly

a. General. The lower part assembly serves as the mount for the dumpy level. The assembly seats on the head of the tripod. The assembly center is the pivoting axis for the telescope.

b. Removal. Refer to figure 6-5 and remove the lower part assembly.

c. Disassembly. Disassemble the lower part assembly in the numerical sequence given in figure 6-9.

d. Cleaning. Clean all the parts of the lower assembly with an approved cleaning solvent and dry thoroughly.

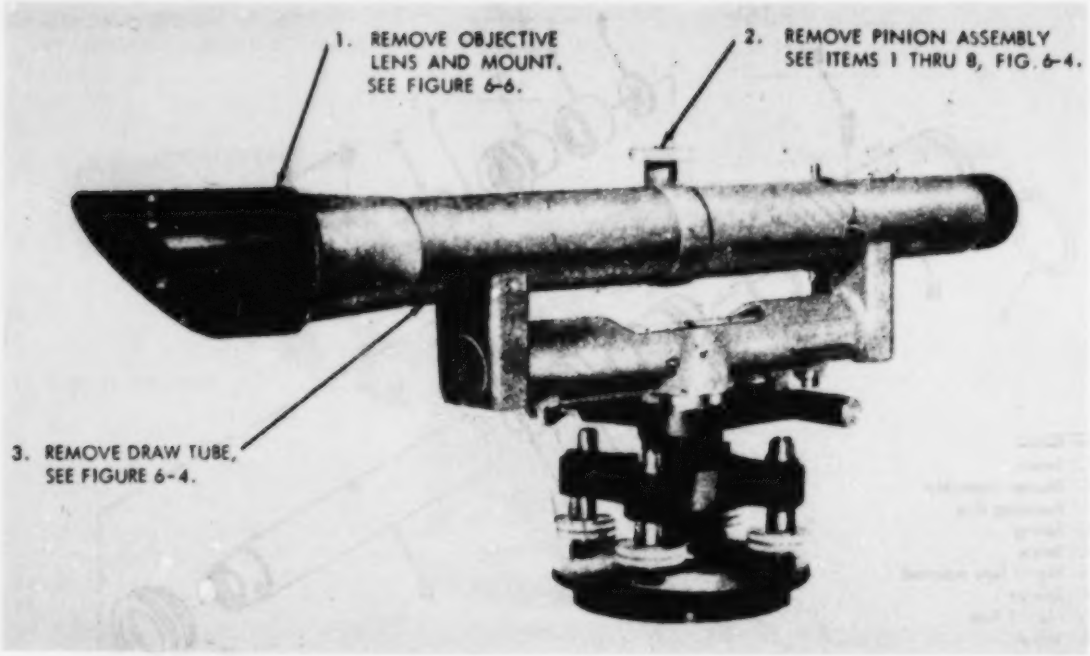
e. Inspection and repair.

(1) Check all parts for breaks, cracks, distortion and burrs.

(2) Remove all burrs. Replace any defective part that cannot be repaired.

f. Reassembly. Reassemble the lower part assembly in the reverse order of the numerical sequence given in figure 6-9.

g. Installation. Refer to figure 6-5 and install the lower part assembly.


1. REMOVE OBJECTIVE LENS AND MOUNT. SEE FIGURE 6-6.
2. REMOVE PINION ASSEMBLY SEE ITEMS 1 THRU 8, FIG. 6-4.
3. REMOVE DRAW TUBE, SEE FIGURE 6-4.

MEC 6675-282-15/6-3

Figure 6-3. Draw tube and pinion assembly, removal and installation.

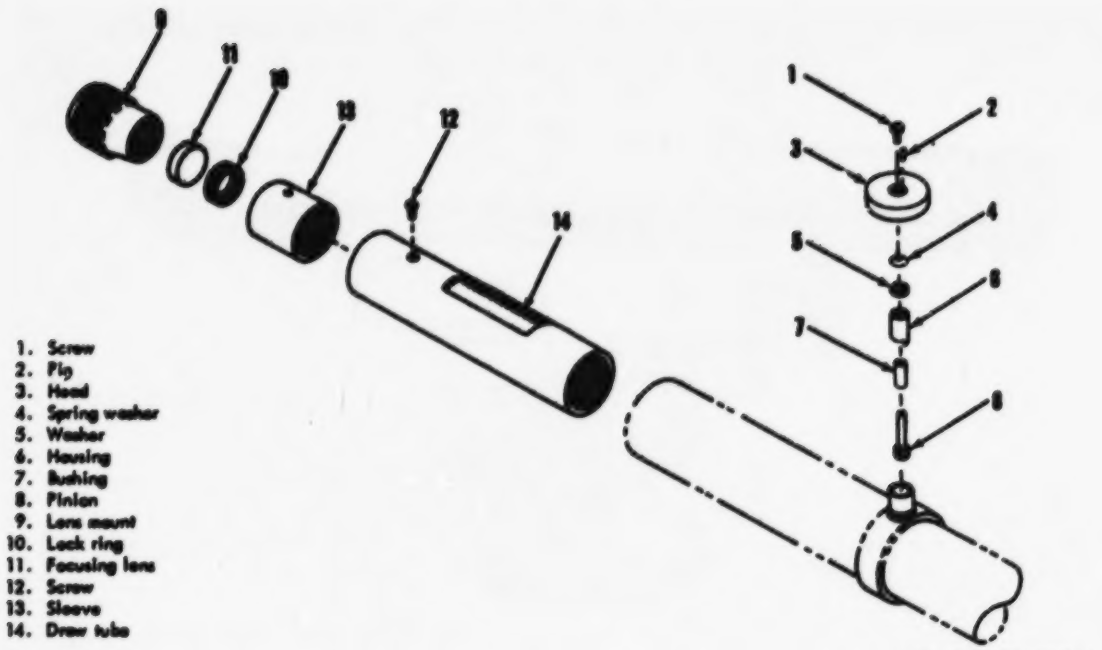


Figure 6-4. Draw tube and pinion assembly, exploded view.

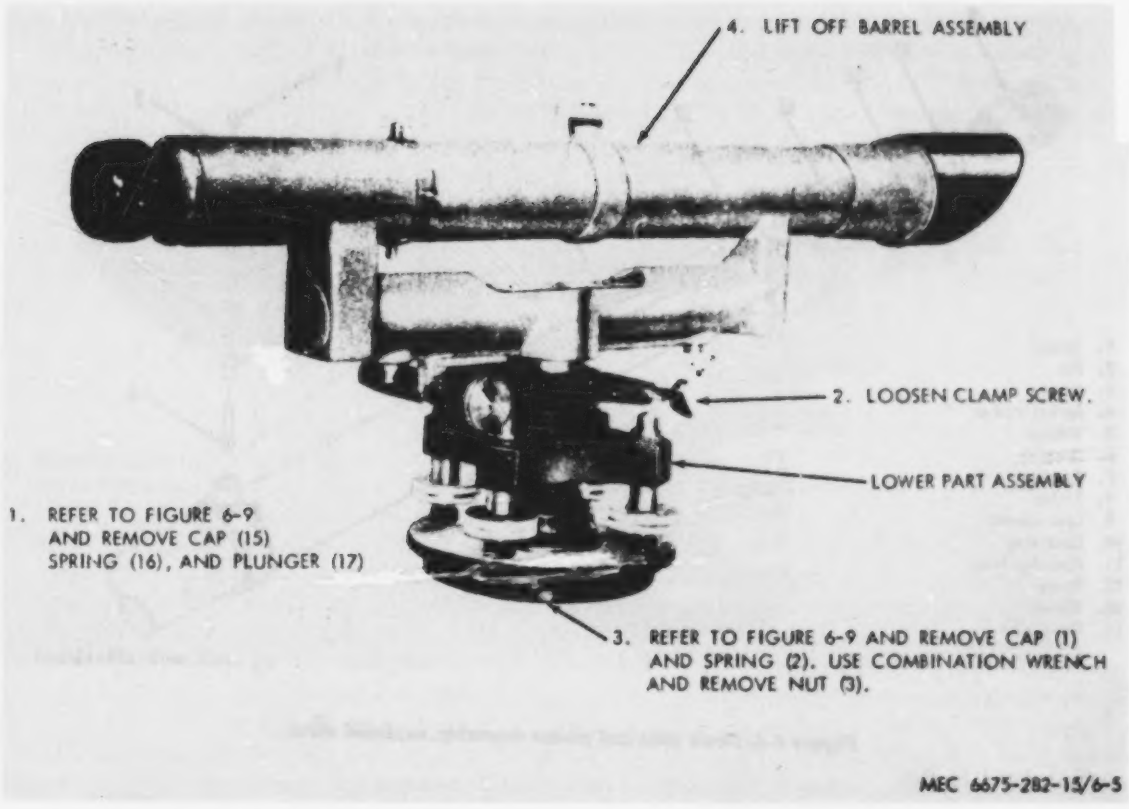
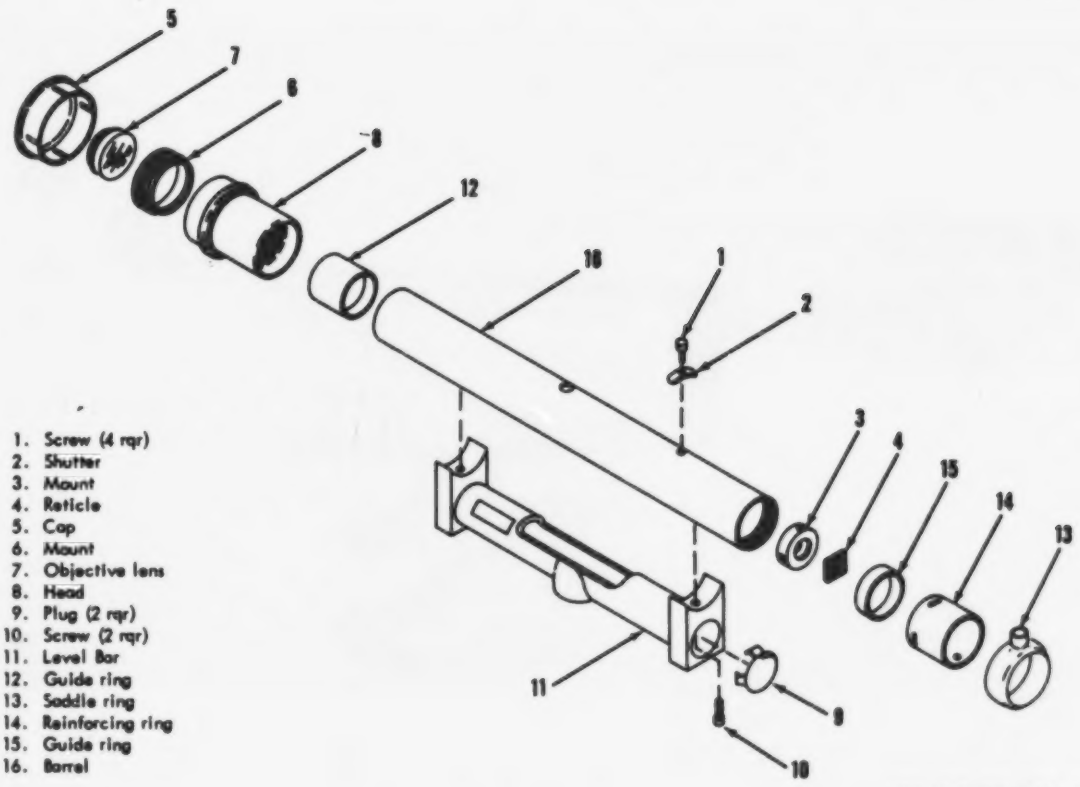
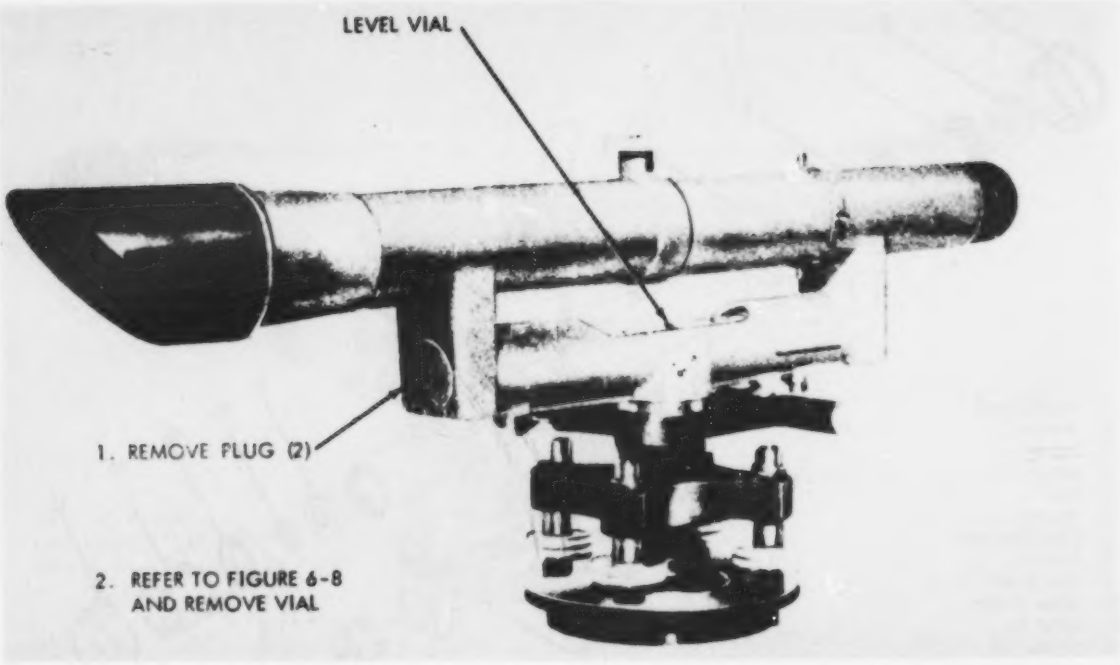

4. LIFT OFF BARREL ASSEMBLY
2. LOOSEN CLAMP SCREW.
LOWER PART ASSEMBLY
1. REFER TO FIGURE 6-9 AND REMOVE CAP (15) SPRING (16), AND PLUNGER (17)
3. REFER TO FIGURE 6-9 AND REMOVE CAP (1) AND SPRING (2). USE COMBINATION WRENCH AND REMOVE NUT (3).
MEC 6675-282-15/6-5

Figure 6-5. Barrel assembly, removal and installation.



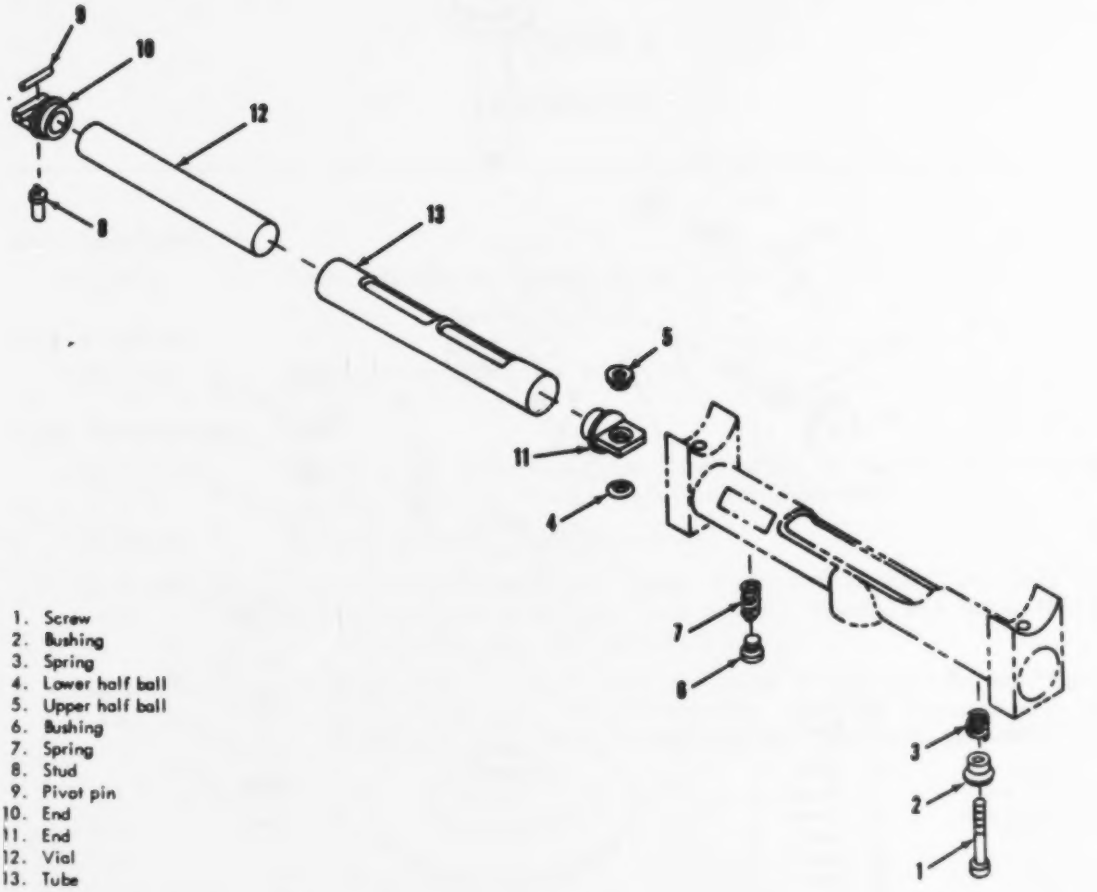
1. Screw (4 rqr)
2. Shutter
3. Mount
4. Reticle
5. Cap
6. Mount
7. Objective lens
8. Head
9. Plug (2 rqr)
10. Screw (2 rqr)
11. Level Bar
12. Guide ring
13. Saddle ring
14. Reinforcing ring
15. Guide ring
16. Barrel

Figure 6-6. Barrel assembly, exploded view.



MEC 6675-282-15/6-7

Figure 6-7. Level vial assembly, removal and installation.



1. Screw
2. Bushing
3. Spring
4. Lower half ball
5. Upper half ball
6. Bushing
7. Spring
8. Stud
9. Pivot pin
10. End
11. End
12. Vial
13. Tube

Figure 6-8. Level vial assembly, exploded view.

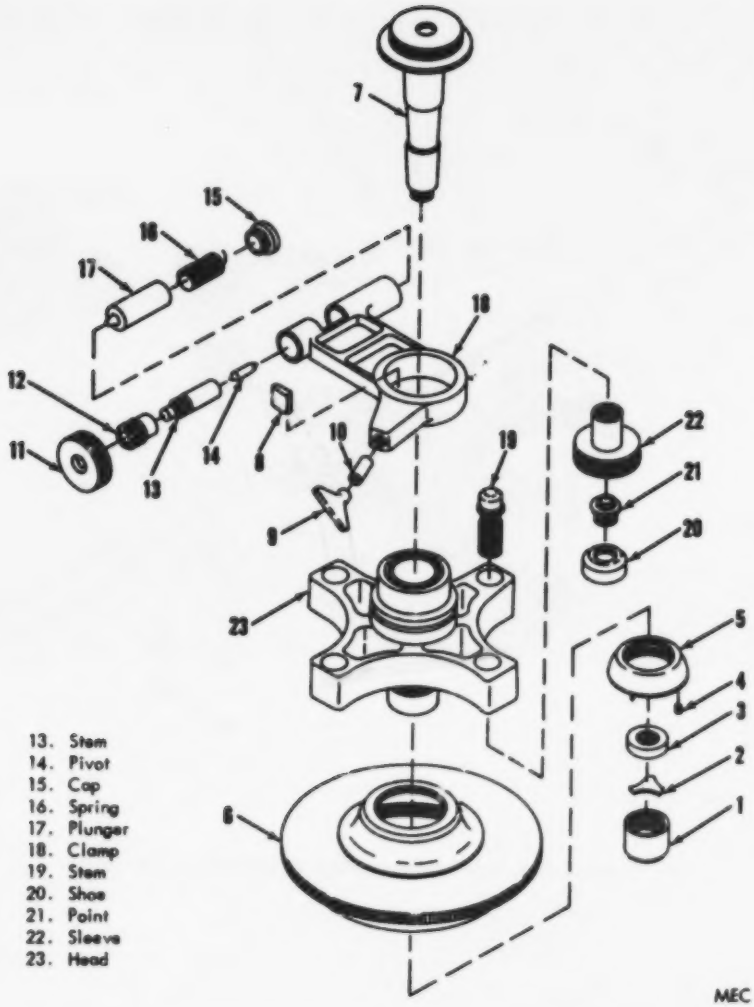


Figure 6-9. Lower part assembly, exploded view.

APPENDIX A

REFERENCES

A-1. Lubrication

C9100IL	Fuels, Lubricants, Oils and Waxes

A-2. Painting

TM 9-213	Painting Instructions for Field Use

A-3. Maintenance

TB ENG 301	Identification, Inspection, and Classification of Surveying Instruments-Level, Surveying, Dumpy Style Federal Class 6675
TM 38-750	Army Equipment Record Procedures
TM 5-6675-282-20P	Organizational Maintenance Repair Parts and Special Tools List: Level, Surveying: Mounted Type, Dumpy Style (Keuffel and Esser Model 75 0300 Special) FSN 6675-937-6863
TM 5-6675-282-35P	Direct Support, General Support and Depot Maintenance Repair Parts and Special Tools List: Level, Surveying, Mounted Type, Dumpy Style (Keuffel and Esser Model 75 0300 Special) FSN 6675-937-6863

APPENDIX B

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

B-1. Scope

This appendix lists items which accompany the Level, Surveying, Dumpy or are required for installation, operation, or operator's maintenance.

B-2. General

Basic Issue Items—Section II. This section is a listing of accessories, repair parts, tools, and publications required for operator's maintenance and operation, initially issued with, or authorized for the dumpy level.

B-3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items, Section II:

a. Source, Maintenance, and Recoverability Codes (SMR), Column (1):

(1) Source Code indicates the selection status and source for the listed item. Source codes are:

Code	Explanation
P	Applied to repair parts which are stocked in or supplied from GSA/DSA Army supply system, and authorized for use at indicated maintenance categories.
M	Applied to repair parts which are not procured or stocked but are to be manufactured at indicated maintenance categories.
A	Applied to assemblies which are not procured or stocked as such, but made up of two or more units, each of which carry individual stock numbers and descriptions and are procured and stocked and can be assembled by units at indicated maintenance categories.
X	Applied to parts and assemblies which are not procured or stocked, the mortality of which is normally below that of the applicable end item, and the failure of which should result in retirement of the end item from the supply system.
X1	Applied to repair parts which are not procured or stocked, the requirement for which will be supplied by use of the next higher assembly or components.
X2	Applied to repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain them through cannibalization; if not obtainable through cannibalization, such repair parts will be requisitioned with supporting justification through normal supply channels.
C	Applied to repair parts authorized for local procurements. If not obtainable from local procurement, such repair parts will be requisitioned through normal supply channels with a supporting statement of nonavailability from local procurement.
G	Applied to major assemblies that are procured with PEMA (Procurement Equipment Missile Army) funds for initial issue only to be used as exchange assemblies at DSU and GSU level or returned to depot supply level.

Note. Source code is not shown on common hardware items known to be readily available in Army supply channels and through local procurement.

(2) Maintenance Code indicates the lowest category of maintenance authorized to install the listed item. The maintenance level code is:

Code	Explanation
C	Operator/crew

(3) Recoverability Code indicates whether unservicable items should be returned for recovery of salvage. Items not coded are expendable. Recoverability codes are:

Code	Explanation
R	Applied to repair parts and assemblies which are economically repairable at DSU and GSU activities and are normally furnished by supply on an exchange basis.
T	Applied to high-dollar value recoverable repair parts which are subject to special handling and are issued on an exchange basis. Such repair parts are normally repaired or overhauled at depot maintenance activities.
U	Applied to repair parts specifically selected for salvage by reclamation units because of precious metal content, critical materials, high-dollar value reusable castings and castings.

b. Federal Stock Number, Column (2). This column indicates the Federal stock number for the item.

c. Description, Column (3). This column indicates the Federal item name and any additional description required. A five-digit manufacturer's or other service code is shown in parentheses followed by the manufacturer's part number. Repair parts quantities included in kits, sets, and assemblies that differ from the actual quantity used in the specific item, are listed in parentheses following the repair part name.

d. Unit of Issue, Column (4). This column indicates the unit used as a basis of issue, e.g., ea, pr, ft, yd, etc.

e. Quantity Incorporated in Unit Pack, Column (5). This column indicates the actual quantity contained in the unit pack.

f. Quantity Incorporated in Unit, Column (6). This column indicates the quantity of the item used in the equipment.

g. Quantity Furnished with Equipmnet, Column (7). This column indicates the quantity of an item furnished with the equipment in excess of the quantity incorporated in the unit.

h. Quantity Authorized, Column (8). This column indicates the quantity of an item authorized the operator/crew to have on hand or to obtain as required. As required items are indicated with an asterisk.

i. Illustration, Column (9). This column is divided as follows:

(1) *Figure Number, Column (9) (a),* indicates the figure number of the illustration in which the item is shown.

(2) *Item Number, Column (9) (b),* indicates the callout number used to reference the item in the illustration.

B-4. Federal Supply Code

Code	Manufacturer
33363	Keuffel & Esser Co.

Section II. BASIC ISSUE ITEMS LIST

(1) Source, maint, and recov code			(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) Illustration	
(a) S	(b) M	(c) R	Federal stock No.	Description	Unit of issue	Qty inc in unit pack	Qty inc in unit	Qty furn with equip	Qty auth	(A) Fig No.	(B) Item No.
				GROUP 31—BASIC ISSUE ITEMS MANUFACTURED INSTALLED							
				3100—BASIC ISSUE ITEMS, MANUFACTURER OR DEPOT INSTALLED							
P	C		6675-427-3608	COVER: telescope, plastic			1		1	2-2	
P	C		7920-205-0565	BRUSH: dust			1		1	2-2	
P	C		6675-641-3525	PIN: adjusting, instrument, steel, small			2		2	2-2	
P	C		5120-351-3521	WRENCH: spanner (Special Wrench Required by Direct Support)			1		1	2-2	
P	C			CAP: dust, telescope, objective (33363) F20965			1		1	6-6	5
P	C			SUNSHADE: (33363) A21181			1		1	1-1	
P	C		9150-985-7243	GREASE: aircraft and instrument, 1 ounce tube			1		1	2-2	

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

C-1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III lists the special tools and test equipment required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance function.

C-2. Explanation of Columns in Section II

a. Group Number, Column (1). The functional group is a numerical group set up on a functional basis. The applicable functional grouping indexes (obtained from TB 750-93-1, Functional Grouping Codes) are listed on the MAC (Maintenance Allocation Chart) in the appropriate numerical sequence. These indexes are normally set up in accordance with their function and proximity to each other.

b. Functional Group, Column (2). This column contains a brief description of the components of each functional group.

c. Maintenance Functions, Column (3). This column lists the various maintenance functions (A through K) and indicates the lowest maintenance category authorized to perform these functions. The symbol designations for the various maintenance categories are as follows:

C—Operator or crew
O—Organizational maintenance
F—Direct support maintenance
H—General support maintenance
D—Depot maintenance

The maintenance functions are defined as follows:

A—Inspect: To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.
B—Test: To verify serviceability and to detect electrical or mechanical failure by use of test equipment.
C—Service: To clean, to preserve, to charge, to paint, and to add fuel, lubricants, cooling agents, and air.
D—Adjust: To rectify to the extent necessary to bring into proper operating range.
E—Aline: To adjust specified variable elements of an item to bring to optimum performance.
F—Calibrate: To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.
G—Install: To set up for use in an operational environment such as an emplacement, site, or vehicle.
H—Replace: To replace unserviceable items with serviceable assemblies, subassemblies, or parts.
I—Repair: To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.
J—Overhaul: To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards using the Inspect and Repair Only as Necessary (IROAN) technique.
K—Rebuild: To restore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or

unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

d. Tools and Equipment, Column (4). This column is provided for referencing by code the special tools and test equipment, (Sec. III) required to perform the maintenance functions (sec. II).

e. Remarks, Column (5). This column is provided for referencing by code the remarks (sec. IV) pertinent to the maintenance functions.

C-3. Explanation of Columns in Section III

a. Reference Code. This column consists of a number and a letter separated by a dash. The number references the T and TE (Tools and Test Equipment) requirements column on the MAC. The letter represents the specific maintenance function the item is to be used with. The letter is representative of columns A through K on the MAC.

b. Maintenance Level. This column shows the lowest level of maintenance authorized to use the special tool or test equipment.

c. Nomenclature. This column lists the name or identification of the tool or test equipment.

d. Tool Number. This column lists the manufacturer's code and part number, or Federal stock number of tools and test equipment.

C-4. Explanation of Columns in Section IV

a. Reference Code. This column consists of two letters separated by a dash, both of which are references to section II. The first letter references column 5 and the second letter references a maintenance function, column 3, A through K.

b. Remarks. This column lists information pertinent to the maintenance function being performed, as indicated on the MAC, section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Functional group	(3) Maintenance functions											(4) Tools and test equipment	(5) Remarks
		A	B	C	D	E	F	G	H	I	J	K		
		Inspect	Test	Service	Adjust	Aline	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
18	BODY, CAB, HOOD AND HULL													
1808	Carrying Case	--	--	C	--	--	--	--	--	O				
22	ACCESSORY ITEMS													
2202	Accessory Items		--	--	--	--	--	--	C					
67	PRECISION INSTRUMENT													
6700	Major Assemblage													
	Level, surveying	--	--	C	C	--	--	--	--	--	D	--	----------	A
	Base	--	--	C	--	--	--	--	F					
	Cap, spindle	--	--	--	--	--	--	--	F					
	Collar, clamp	--	--	--	--	--	--	--	F					
	Head, leveling	--	--	--	--	--	--	--	--	D				
	Screw assembly, adjusting	--	--	--	--	--	--	--	F	D				
	Tangent screw	--	--	--	--	--	--	--	F	D				
6701	Telescope Assembly													
	Telescope	--	--	--	--	--	--	--	--	--	D			
	Gear assembly	--	--	--	--	--	--	--	F	D				
	Reticule assembly	--	--	--	C	--	--	--	--	D				
6702	Optics													
	Eyepiece assembly	--	--	--	--	--	--	--	F	D				
	Lens assembly, objective	--	--	C	--	--	--	--	--	D				
6718	Level Assembly	--	--	C	C	--	--	--	F	--	--	--	1	B
6719	Tripods													
	Head assembly	O	--	--	--	--	--	--	O	O				
	Leg assembly	O	--	--	--	--	--	--	O	O				
	Clamp assembly, leg	O												

Section III. SPECIAL TOOL AND SPECIAL TEST EQUIPMENT REQUIREMENTS

Reference code	Maintenance level	Nomenclature	Tool number
1-G	F	Wrench, Spanner	FSN 5120-858-3521

Section IV. REMARKS

Reference code	Remarks
A-A	External
B-A	External

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